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ANNUAL REPORT 1979-80

Department of Agriculture New South Wales

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No. 113

1980

NEW SOUTH WALES

REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

Year ended 30 June, 1980

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The Hon. J. R. HALLAM,
Minister for Agriculture,
Sydney.

Sir,

I have the honour to present a report reviewing the activities of the Department of Agriculture for the year ended 30th June, 1980.

G. H. KNOWLES,
Director-General.

The objectives of the New South Wales Department of Agriculture are to safeguard, and improve the productivity of, the agricultural industries of New South Wales; and to encourage the orderly marketing of safe, acceptable produce, with consequent improvement in the prosperity and quality of life of both rural and urban communities.

The main aim of this report is to enable the Minister to table in Parliament a comprehensive record of what the Department did to attain its objectives during the year under review.

This report is also distributed to libraries, industry leaders and others throughout Australia and overseas, usually on an exchange basis. It is not intended for a wide audience, which is catered for by other, more regular, publications.

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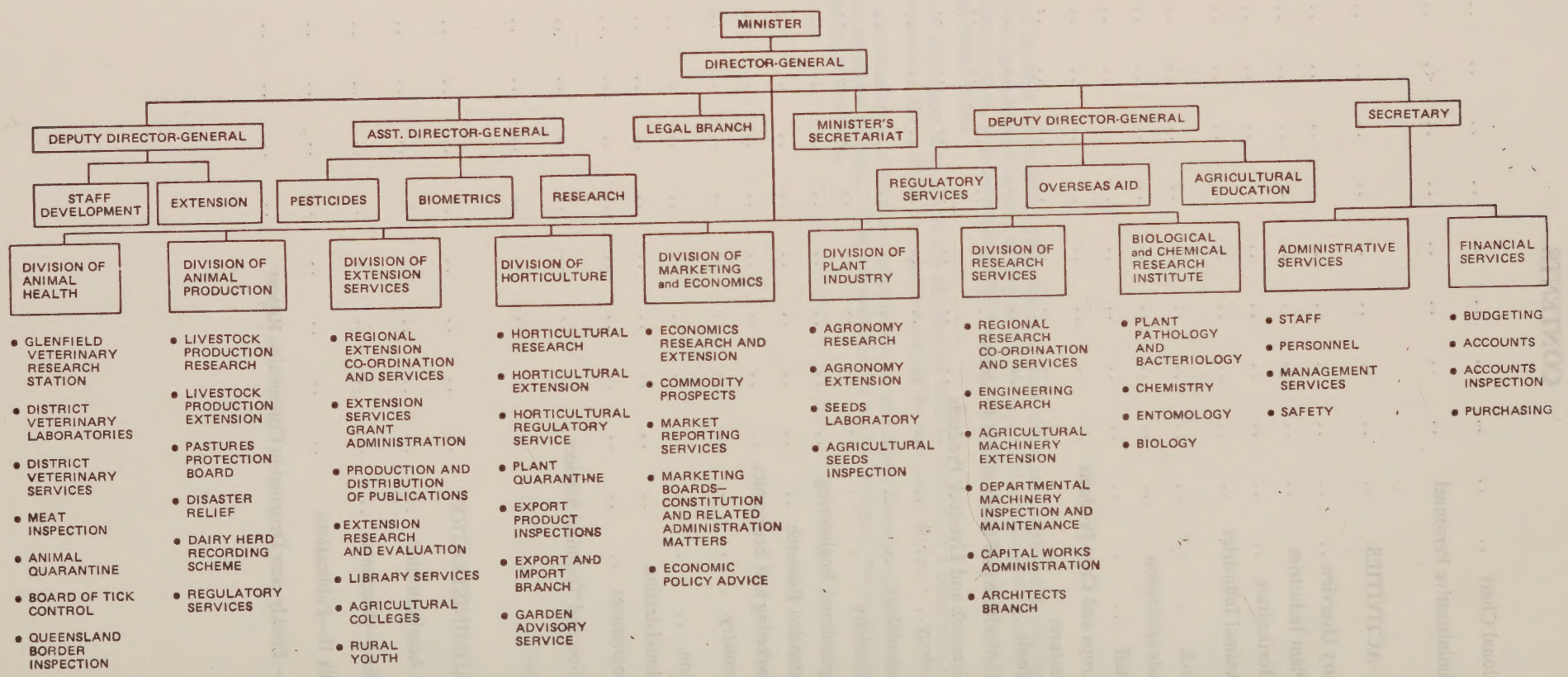
New South Wales Department of Agriculture



SENIOR ADMINISTRATIVE PERSONNEL

As at 30th June, 1980

Minister	Hon. J. R. HALLAM, M.L.C.
Director-General	R. M. WATTS
Deputy Director-General	B. OWEN FRENCH
Deputy Director-General	Dr R. B. DUN
Assistant Director-General	Dr K. P. SHERIDAN
Secretary	R. E. JONES
Assistant Secretary	D. A. SMITH (Finance)
Assistant Secretary	W. G. BRYANT (Administration)
Chiefs of Divisions:	
Animal Health	D. H. MUMFORD
Animal Production	Dr P. McINNES
Horticulture	G. R. GREGORY
Plant Industry	Dr S. G. GRIMMETT
Marketing and Economics	Dr D. E. MACCALLUM
Extension Services	F. S. BENECKE
Research Services	K. E. HUTTON
Chief Biometrician	E. A. ROBERTS
Director of Pesticides and Environmental Studies	L. R. GREENUP
Biological and Chemical Research Institute Management Committee:	
Chairman and Director of Chemistry	Dr F. R. HIGGINSON
Acting Director of Biology	Dr P. F. KABLE
Director of Entomology	M. CASIMIR
Executive Officer	C. J. PARKER
Director, Aid Programmes	J. H. BALLARD
Principals, Agricultural Colleges:	
C. B. Alexander Agricultural College	G. C. McFARLANE
Orange Agricultural College	R. J. NAPIER
Yanco Agricultural College	K. W. BANNISTER

PART A – ACTIVITIES

INDUSTRY OVERVIEW

PLANT INDUSTRIES

THE SEASON

The very dry summer of 1979–80 resulted in little build-up of subsoil moisture. Fortunately, in most southern and central areas, rainfall in late autumn and early winter, although only moderate, was sufficient for sowing winter crops. However, in the north rainfall was lighter, falls were less frequent and sowings were delayed. Long dry spells in late winter and early spring, especially in the north, reduced yield potentials substantially. The late spring in central and southern areas was hot and dry but in the north widespread storms occurred. Late spring frosts caused damage to flowering crops.

Dry spells in the winter and early spring reduced feed available from native and improved pastures. Consequently oat and barley crops were grazed heavily with fewer crops than usual being allowed to recover for a grain harvest.

Many areas were declared drought-stricken in the late summer-autumn of 1979–80. The area sown to dryland summer crops, especially sorghum, was reduced. Dryland pastures dried out very quickly and hand feeding of stock became widespread. The drought in most of the State was not relieved until May. Some districts remained drought-stricken at the end of June.

WINTER CEREALS

Crop	1979–80 (estimated)				1978–9 (actual)			
	Area ('000 ha)		Grain production ('000 t)	Yield (t/ha)	Area ('000 ha)		Grain production ('000 t)	Yield (t/ha)
	Total	For grain			Total	For grain		
Wheat	3 443	3 415	6 000	1.76	3 184	3 162	6 640	2.09
Oats..	696	351	463	1.32	724	431	594	1.37
Barley	474	447	688	1.54	489	468	676	1.44
Ryecorn	N.A.	N.A.	N.A.	N.A.	6	4	4	1.06
Triticale	N.A.	N.A.	N.A.	N.A.	..	2	3	1.24

Wheat

Moderate falls of rain in central and southern and some northern areas enabled a large proportion of the crop to be sown at generally optimum times. However continuing dry conditions in the marginal areas of the north west delayed sowings there.

The area sown was about 10 per cent above that of the previous season and there were prospects of a record crop until protracted dry spells rapidly lowered yield potential. However, the 1979–80 crop was still the second highest on record.

The two leading varieties are Condor and Songlen, with Egret, Shortim and Cook increasing. Semi-dwarf wheat varieties are still increasing in popularity. The standard height varieties Timgalen, Olympic and Gatcher are declining in importance.

Because of the high prices for fuel, many farmers are applying the new techniques of reduced cultivation and direct drilling.

Overall losses due to disease were small. Stripe rust in wheat was detected for the first time in Australia. This disease sometimes causes serious yield losses in areas with a cool climate overseas. Fortunately, most of the main wheat varieties grown in New South Wales have resistance or satisfactory tolerance.

Speckled leaf blotch was again widespread, especially in central and southern areas during the winter, but the dry spring checked development.

Yellow leaf spot was widespread, especially in the north, and was mostly associated with crops sown into stubble. Crown rot was again common in the north because of dry conditions in the early spring, but losses were reduced because of moist conditions at harvest.

Oats

Lack of autumn rains reduced the area sown to oats. Because of dry conditions only about 45 per cent of the total area was harvested for grain, compared with about 55 per cent in average years.

Cooba and Coolabah are the leading varieties. In third position is the comparatively new dual-purpose variety Blackbutt. Cassia is replacing Avon as a grain variety in the better rainfall areas. On the coast Saia is still an important variety for grazing. Two crossbred varieties are undergoing final tests.

Barley

The 1979–80 season was more favourable for barley than for wheat.

Clipper is the dominant variety, with over 70 per cent of the total sowings, which continues the trend of the last two years.

Scald was severe and widespread in barley in southern areas and losses in yield of up to 20 per cent were common.

Triticale

Interest is increasing in triticale. The Department and New England University, Armidale, jointly released a new early-maturing, strong-strawed, high-yielding, disease-resistant variety Satu for 1980 sowings.

SUMMER CEREALS

Rice

A record area of 110 451 ha was sown in 1979–80. Long periods of cold weather at flowering caused sterility. Average yields were down by 0.5 t/ha, and the total yield was 585 000 t.

Grain Sorghum

The drought caused serious crop losses to the dryland crop during 1979–80. Irrigated crops harvested high-quality grain yielding up to 12.5 t/ha owing to favourable weather and the use of modern practices.

Yellow Maize

It is estimated that production was halved by the drought. A few favoured pockets benefited from storms, but elsewhere the coastal crop failed. Inland irrigated crops yielded up to 11.5 t/ha.

Sweet Corn

The large carry-over of processed sweet corn from record yields in the 1978–9 season, plus the availability of cheaper N.Z. products, resulted in a 50 per cent cut in sweet corn area contracts.

Minor Grains

Broom millet production fell because of the drought. High-quality fibre was harvested from the small crop. Canary seed was in demand but birdseed millets were not.

OTHER CROPS

Grain Legumes

Lupin production was affected by the drought. There was a very strong demand for grain, with increased grower interest. Areas of field peas, mung beans, cowpeas, horse beans and dry beans were also grown.

Cotton

Once again a record area, estimated at 49 000 ha, was planted and as a consequence of excellent conditions for irrigated production approximately 265 000 bales were produced. Summer and autumn temperatures were conducive to high yields and good-quality fibre. Wet weather during harvest caused some delays, but the overall effects on quality and yield were minor, as were the effects of insect pests and diseases.

Tobacco

The area planted contracted to 695 ha, with an average yield of 1 700 kg/ha and a total production of approximately 1.2 million kg of leaf. The main northern tobacco-growing areas experienced harsh hot dry growing conditions, and wastage from inferior leaf was higher than normal. There was virtually no blue mould.

Winter Oilseeds

Areas increased from 41 400 ha in 1978–9 to 71 000 ha, through an increase in the area of rapeseed. The respective estimates of production and area are as follows: rapeseed, 21 000 t from 26 000 ha; safflower, 22 000 t from 40 000 ha; lindseed, 3 500 t from 5 000 ha. Gross winter oilseed production was estimated at 46 500 t compared with 30 410 t in the preceding year.

Soybeans

Interest in soybeans increased considerably. A record of 27 000 ha was sown, with a probable production of 48 000 t. Irrigated yields throughout inland New South Wales were high, but May rains in coastal areas following upon a dry summer seriously reduced average yields. A root rot occurred in the Macquarie and Gwydir Valleys for the first time. This is an important disease of soybeans overseas.

Sunflower

Dry seasonal conditions reduced the area sown to half that for the preceding season. An estimated 35 000 ha produced about 17 000 t. About half this production came from areas somewhat more favoured by summer rainfall in the Coonabarabran, Gunnedah and adjacent districts. For the first time for a few years, Rutherglen bug did not constitute a major insect pest problem.

Miscellaneous Crops

The dry season reduced the area sown to buckwheat drastically. Peanut sowings were maintained at previous levels of approximately 300 ha. A small area of sesame was grown on the north west slopes and further commercial experiments with jojoba were initiated. An additional 20 ha of tea was planted in 1979. This crop demonstrated its capacity to cope with a dry summer season on the far north coast.

PASTURES

Natural Pastures

The state's 15 million ha of natural pasture were affected by the drought in late summer-autumn of 1979–80. Recovery will be slow in most areas other than the south west, where heavy falls of rain occurred early in the season; however, bluegreen lucerne aphids continue to damage medics there.

Improved Natural Pastures

The increasing use of superphosphate on improved natural pastures containing legumes steadied as the drought extended. However, large areas were topdressed, especially on the tablelands. In the central west and north west the lucerne aphids have again taken their toll on annual medics.

Sown Pastures

Because of the favourable economic climate, farmers once again turned to the more expensive recommended species. However, the downturn in cash flow resulting from the drought dampened this activity. Recommended varieties have again shown their superiority under adverse seasonal conditions.

Lucerne

The demand for seed of aphid-resistant lucerne varieties has remained high, whereas sowings of the susceptible variety, Hunter River, have declined markedly. Imported varieties are proving valuable alternatives to Hunter River. The arrival of the pea aphid (*Acyrthosiphon pisum*) early in 1980 is of concern; however, the pest has yet to demonstrate its full potential. Among the varieties resistant to the spotted alfalfa aphid (*Therioaphis trifolii*) there are a number with moderate resistance and some tolerance to the pea aphid.

Aphid activity declined on dryland lucerne as the drought intensified but remained a problem in irrigated swards. The blue green aphid (*Acyrthosiphon kondoi*) damaged lucerne in the cooler months and the finding of resistant varieties remains a priority.

The first triple aphid-resistant and highly winter-active variety, Siriver, developed by the CSIRO, was registered and released. It is expected that seed of this variety and of Nova, developed by the Department of Agriculture, will be available to farmers for sowing in autumn 1981.

New Pasture Plants

The new subterranean clovers Northam, Nungarin and Trikkala, all low in oestrogen, are steadily increasing in popularity.

The recently released grasses, Sirolan and Sirosa phalaris, together with Redquin red clover, continue to be sought after. Scarcity of seed has restricted sowing.

On the coast, upper slopes and tablelands, Haifa white clover, Safari Kenya white clover, a number of ryegrasses and Namoi woolly pod vetch are all increasing in use. In dairying districts special purpose pastures, of the tetraploid ryegrasses in particular, are becoming increasingly popular to augment the winter feed supply.

Fertilizer Application to Pasture and Lucerne

Fertilizer has become a major cost in pasture development, but improved farm cash flows resulted in a second year of increased fertilizer use. Aerial applications continued to be in wide use. The area topdressed in this way was 2 361 000 ha and 260 146 t of fertilizer was distributed.

On the coast the use of potash and nitrogen fertilizers on dairy pastures continues to increase. Lime is also being used on acid soils on both the coast and tablelands, where aluminium and manganese toxicity prevent pastures reaching their potential. The cost of lime prevents its wider use.

Fodder Conservation

Hay and silage reserves have been severely depleted as cattle and sheep have been hand fed for much of the year in many areas. Because most of the State was drought-stricken, agistment options were limited.

Since the arrival of the lucerne aphids in 1977, lucerne hay production has declined by 30 per cent. This has caused a price rise and stimulated demand for other pasture hay.

Pasture Pests Other Than Aphids

There was a major plague of the Australian plague locusts, (*Chortoicetes terminifera*), throughout the central division of the State in spring, rivalling in intensity the very large plagues of the 1930s and 1950s. However, the second swarming generation in summer was greatly reduced and only of minor concern. The wingless grasshopper (*Phaulacridium vittatum*) reached high populations in all tableland regions and severely damaged pasture in late spring and summer.

The black-headed pasture cockchafer (*Aphodius tasmaniae*), the red-legged earth mite (*Halotydeus destructor*) and the blue oat mite (*Penthaleus major*), seriously damaged pastures on the central and southern tablelands and central and south west slopes during the winter and spring. Pastures in parts of the central west and Hunter were seriously affected by the black field cricket (*Teleogryllus commodus*) in summer and autumn.

IRRIGATION

The drought of 1979–80 highlighted the need for a major improvement in the conservation of water for stock. Many graziers had to purchase water. Farm dams are generally constructed to conserve sufficient water for about six months. Supplies of water for irrigation were not affected by the drought.

Within the Irrigation Districts and Areas in the Murray and Murrumbidgee Valleys, the area sown to rice increased by 5.6 per cent. However, the downward trend in the area of irrigated pastures continued, largely as a result of better returns from cropping. The major crops being grown on newly developed land in the Gwydir Valley are cotton (9 600 ha) and soybeans (3 200 ha).

Interest has been maintained in the installation of low-labour sprinkler systems in inland river valleys as an alternative to surface systems. Their high energy demands are being checked by installing low-pressure spray systems where soils and topography permit.

A joint extension project of the Department of Agriculture and the Water Resources Commission was initiated during the year to study alternative redevelopment plans for irrigation farms in the Riverina. The high cost of earthmoving is prompting a reappraisal of the requirement for land forming. In the absence of economic comparisons, many farmers are using the natural slope of the land to avoid this cost.

SEED PRODUCTION

The early end to the spring in 1979 significantly reduced the harvest of pasture seed in New South Wales, especially of subterranean clover.

There was little carry-over of stock from the previous season, and the general shortage of seed of pasture species caused prices to increase sharply. The very dry autumn of 1980 produced some nervousness among seed merchants holding stocks of high-priced seed, but the general rains in May and early June meant that much of the seed was sold.

The problem of varietal contamination of subclover seed paddocks in the Riverina is still causing concern.

HORTICULTURE

CITRUS

Seasonal conditions were favourable for citrus during the winter/spring period, although late frosts caused minor damage to fruit and trees in inland districts. However in the summer/autumn period drought adversely affected tree health and crops in dry farming situations.

Production of main crop citrus in 1979–80 was 215 771 t, slightly below the previous crop of 216 939 t.

The area planted to citrus is 12 062 ha, an increase of 275 ha, indicating a stable situation. The main increase was again in the Murrumbidgee Irrigation Areas (M.I.A.).

The FISCC* increased minimum prices in 1979–80 for most processing citrus fruits (fruit delivered to country factories). Prices fixed were: Navels $76/t (up $2); Valcenias $90 (up $4); lemons $99 (no change); grapefruit $78 (no change since 1975–6). State and regional statutory citrus authorities further increased these minimum prices for Navels by $4/t and Valencias by $3/t. The continued strong demand for Valencias by processors was reflected in prices of $115/t for some inland fruit. Problems continued with the economic disposal of Washington Navels, grapefruit and lemons either for sale fresh or for processing.

The Federal Government in 1979 provided for a variable tariff on imported orange and mandarin juice. This is to be reviewed in 1982. It will bring some stability to the industry and permit structural changes and adjustments to take place. However, the importation of juices during the first nine months of the current year has already exceeded the imports in 1975–6. This trend is causing concern within the industry and caution in expanding orange plantings, especially Valencias, is necessary.

Although not a major citrus exporting State, New South Wales supplied increased quantities of citrus, particularly lemons, for export. Total Australian exports to 21 countries increased from 26.6 kt in 1978 to 45 kt owing to reduced production in northern hemisphere countries.

Pests and diseases were generally at low levels. Minor problems occurred in some inland districts with red scale, snails, brown rot, dry stem, puffing and creasing, and in coastal districts melanose caused some downgradings and white wax scale increased in some localities.

GRAPES

Winter months remained fairly dry and mild with the reserves of soil moisture low as budburst approached. Pruning was facilitated by the fine weather and was completed in time for an early budburst. About 10 per cent of the State's spur-pruned wine-grape vines were machine pruned.

Despite generally favourable conditions in the irrigation areas, there was some frost damage in the mid Murray and at Leeton. Isolated but serious frost damage occurred in Mudgee wine and table grapes, and there was damage also at Broke. In the Pomona area near Wentworth severe hailstorm damage was experienced in October.

During flowering and fruit set, conditions remained dry and soil moisture levels became critical. Wind affected flowering in the lower Murray, reducing fruit set in Gordos. December and January remained dry and severe stress symptoms became obvious in Hunter plantings.

Table-grape marketing commenced in December with Sweetwater from Orchard Hills followed by Sultanas and Cardinals from the Lower Murray and Sultanas from Bourke. Prices were generally good.

Vintage in the Hunter commenced about two weeks early. By the end of January a large proportion of the white grapes had been processed, and the vintage was practically completed by the end of February. Lower Murray harvest of Sultanas for wine was well under way by mid January. A considerable proportion of Shiraz in the Hunter and the M.I.A. was used for white wine. Dry weather continued into February and March for the dried Sultana crop, providing ideal conditions. Elsewhere rainfall was insufficient to affect the later stages of the vintage.

Because of world shortages of dried vine fruits and the relatively low Gordo crop, there was keen competition for dual-purpose varieties. The quality of dried Sultanas was the best ever for many growers, with 80 per cent rated as five crown and nearly all the rest as four crown. The crop was heavier than normal and, with prices in excess of $1,000/sweat box tonne, growers experienced a memorable season. At the same time the quality of Sultanas for winemaking was very good owing to cool ripening weather, which created the sugar-acid balance required by winemakers.

Although earlier estimates put the Hunter Valley crop at a possible 25 000 t, the vintage fell to 14 500 t because of dry weather. The Mudgee wine grape crop exceeded 1 300 t, some being sold to Hunter Valley processors. The M.I.A. reported a record crush of 90 800 t, which included 1 600 t from the Murray. An estimated 77 000 t of grapes were produced in the Lower Murray, of which 16 500 were processed for wine and most of the remainder dried. In all other winemaking areas the quality of grapes was very high, and winemakers were most enthusiastic about the potential of 1980 wines.

* Fruit Industry Sugar Concession Committee.

POME FRUIT

In one of the most difficult years ever experienced by growers of pome fruits, drought conditions prevailed for much of the growing season. Apples produced a lighter crop than in the previous year in the biennial bearing cycle but, even so, the abnormally dry conditions adversely affected fruit and colour development. In Orange, the major production district, 10 to 20 per cent of the fruit did not grow sufficiently to attain minimum legal marketing size as fresh fruit.

Severe frost damage occurred in the New England district, causing significant crop loss and downgrading of the remaining fruit. At Bilpin 3 000 apple trees were badly damaged by bushfires. Hail damage was severe in 12 Orange district orchards. Batlow, Willigobung and New England also suffered from hail and 25 per cent of the Williams pear crop at Batlow was consigned interstate for juicing.

Some pest activity, notably codling moth and two-spotted mite, was favoured by the hot dry growing season and many growers were not satisfied with levels of control achieved. The adverse seasonal conditions demonstrated the value of water for supplementary irrigation, even in the more favoured districts such as Batlow.

The 1980 apple and pear crops were forecast at 62 100 t and 13 800 t respectively, compared with 103 400 t and 12 100 t in 1979. There was considerable interest in apple tree plantings during the 1979 winter, especially at Orange and Batlow. Between 1978 and 1979 apple tree plantings showed a net gain of 27 000 trees but total numbers of pear trees decreased by almost 8 000.

STONE FRUITS

In one of the driest seasons on record, with little useful rain prior to autumn, crops matured up to two weeks early.

The cherry crop of 4 950 t (5 739 t in 1979) was reduced because some fruit was small and some trees at Young were not harvested because of drought. Orange and Lakesland crops were of excellent quality and brought high returns but small fruit from Young was difficult to sell. One grower mechanically harvested white cherries at Young. Exports to South East Asia increased.

Dessert peaches and nectarines again realized high returns. The crops of 10 200 t and 1 400 t were 25 per cent and 45 per cent respectively lower than in 1979 owing to late frosts at Bathurst and drought at Young.

Prunes yielded 1 706 t on the M.I.A. and 495 t at Young, the latter figure being the third lowest over the past 30 years. Production was a little over half that of the previous year, but quality was outstanding.

Canning peaches yielded 12 815 t (12 564 t in 1979), including 561 t of fresh fruit. The 17 per cent price increase and earlier payments renewed grower confidence and new plantings are likely. Labour problems led to increased adoption of mechanical harvesting. Canning apricot crops of 2 010 t were down 68 per cent, because of good size and early maturity 125 t were sold as fresh fruit. Good apricot crops were produced in the Kurrajong district.

Japanese and European plums yielded 3 600 t and 1 250 t respectively, approximately 10 per cent and 25 per cent less than in 1979. There was an increased demand for President plums for export to South East Asia.

BERRY FRUITS

Heavy supplies of strawberries on the market during November and December sold at disappointing prices and there has been a 25 per cent decline in area planted. Thirty-three tonnes of boysenberries were processed at Batlow.

Total plantings of stone, berry and miscellaneous fruits increased from 6 532 ha to 6 558 ha, mostly as a result of new plantings of dessert peaches and miscellaneous fruits.

TROPICAL FRUIT

Bananas

Although the industry is still faced with periods of oversupply with much lower-grade fruit being destroyed at railhead, the planted area increased by 243 ha to 6 931 ha. The increase was spread over all districts. The Coffs Harbour and Macksville districts now account for 52 per cent of the total area.

Bunchy top disease detections increased slightly from 1 126 infected plants last year to 1 325 this year. Although kept at low levels in the northern Tweed district, the disease has spread in the southern Tweed and Brunswick districts. With the increase in infected plantations, the industry-funded patrols cannot maintain adequate inspections. This spread and the rising cost of the scheme ($135,000 last year) is forcing the Banana Growers Federation to consider alternatives. It is likely that they may adopt a system similar to that used in Queensland, with individual growers being responsible for detecting and controlling the disease within their own plantations.

Trials continued with the packing of bananas in clusters of 4–8 fruits, as distinct from complete hands or "singles". The 36 litre fibreboard package makes possible full pallet utilization and forced air cooling. Industry adoption of the concept in New South Wales is predicted.

Other Tropical Fruits

Interest remains high in a large range of tropical fruits. The area planted to avocados has increased to 606 ha (516 ha last year), custard apples to 46 ha (16), guava 58 ha (13) and litchi 54 ha (53).

VEGETABLES

The extended period of dry weather during the spring and summer months had an adverse effect on potato crops in tableland districts and seriously reduced water supplies for irrigation in the Bathurst and Gosford areas. The salt content of many waters reached levels harmful to crops.

Asparagus

Despite the dry weather, overall production was similar to the previous year when 1 156 ha (bearing area) produced 3 750 t. Labour for harvest was in reasonable supply. Substantial quantities of canned asparagus were again imported.

Green Beans

Coastal crops for the fresh market performed well and met a ready market. Processing crops in inland districts were reduced in both area and production to the lowest level since 1970–1. Total area in 1978–9 was 1 522 ha with production at 5 573 t.

Cole Crops

Cauliflower production increased slightly and supplies exceeded demand at some periods. Cabbages performed well and met an adequate demand. Broccoli production increased significantly and led to oversupply. For 1978–9, 826 ha of cabbage produced 15 062 t and 611 ha of cauliflower produced 17 951 t. A number of new varieties of both broccoli and cabbage became available.

Cucurbits

Production of pumpkins, cucumbers and watermelons was maintained at previous levels. Rockmelon production increased and extended to more districts. Fruit quality was generally high and reflected the implementation of the grade standard and a post-harvest dip treatment for control of rots. Zucchini production also tended to increase. Water melon mosaic virus disease was severe in a number of coastal crops.

Onions

Area and production were similar to the previous year. The proportion of the crop mechanically harvested increased. An announcement was made concerning a proposal to set up a dehydration plant at Griffith, mainly for processing onions.

Carrots

Production remained stable for most of the year. Grade standards were introduced and were paralleled by an extension campaign to improve the quality and presentation of the crop in the Griffith district, where the variety Western Red has increased in popularity.

Potatoes

Production declined in tableland districts and increased in the Finley and Coleambally areas; total area and production remained static. The total planting for 1978–9 was 8 256 ha and production 124 156 t. Severe drought in most tableland districts resulted in infestations of tuber moth and an outbreak of purple top wilt at Guyra. White fringed weevil was also severe in that area. Black beetle was again of concern to growers at Dorrigo.

Tomatoes

An oversupplied market for much of the first half of the year, largely because of excessive supplies from Queensland, affected winter and spring production in the Murwillumbah district. Growers in the Sydney area increased their use of microjets and drip irrigation. The trade firmly accepted the variety Floradade because of its appearance and long shelf life. Growers of processing tomatoes had a better season than the previous one and production was estimated at 36 000 t. Most of the crop was mechanically harvested, and some machines used electronic colour sorters. Production of processing tomatoes is concentrating into the Finley district and the Lachlan Valley (Cowra). Big bud virus disease was the worst for many years.

NUTS

The macadamia nut industry has continued to develop with 1 583 ha (up 970 ha) planted in the Lismore district. The 870 ha of pecans planted, mainly in the Moree district, produced approximately 900 t of nuts. Interest is also being shown in the production of almonds, walnuts, chestnuts, pistachios and filberts, but the limited supply of trees is restricting plantings.

ANIMAL INDUSTRIES

VALUE AND SIZE OF THE LIVESTOCK INDUSTRIES, 1978–9

Enterprise	Local value of production* ($ million)		Number of properties in N.S.W. with listed enterprises
	N.S.W.	Australia	
Sheep—			
Mutton and lamb†	113.6	393.3	
Wool	456.3	1 232.6	
Total	569.9	1 625.9	26 567
Beef cattle	518.7	1 969.4	35 769
Dairying	135.5	564.9	4 137
Poultry—			
Chicken meat	136.2	266.3	500‡
Eggs	71.3	169.2	863
Total	207.5	435.5	1 363
Pigs	66.3	237.3	6 400
Apiculture	5.7	14.0	5 000
Total	1 503.6	4 847.1	

* The value placed on commodities at the place of production, ascertained by deducting marketing costs from the gross value of commodities produced.

† Does not include live sheep exports, valued at $22 million (approx.).

‡ Estimate.

Source: Australian Bureau of Statistics publications. Catalogue Numbers 7202.1 and 7503.0.

SHEEP AND WOOL

There is a general feeling of optimism among New South Wales sheep producers. They have clearly expressed their confidence in the long-term prospects for the wool and sheepmeat industries.

A good indication of this confidence is the fact that sheep numbers in N.S.W. (48–50 million) have remained static for the last two years despite fluctuating seasonal conditions and rising production costs. At the same time there has been a noticeable increase in the number of ewes and consequently in the number of lambs and young sheep, whereas the proportion of wethers has been declining. This change in flock composition has been caused by the demand for mutton and older sheep for live export.

Seasonal conditions at the start of the year were excellent but as the year progressed supplies of both feed and water rapidly dwindled, particularly in the northern and central parts of the State. Some areas experienced one of their worst droughts on record.

However, despite these adverse seasonal conditions the demand for all classes of sheep remained excellent, providing ample incentive for breeders to retain their sheep and purchase feed if necessary.

Much of the buoyancy in the sheep market can be attributed to the live sheep trade which has placed a very effective floor in the sheep market; sheep which would have been unsaleable in previous droughts continued to command realistic prices during the past year.

For the coming season the Australian Wool Corporation has increased the minimum reserve price for wool by an amount which will be more than sufficient to combat inflationary trends, thereby ensuring the continued viability of the sheep industry within New South Wales.

BEEF CATTLE

The buoyant market situation at the beginning of the year was maintained until November, when prices fell in response to a reduction in the U.S. market prices, increases in poultry and pigmeat production, and consumer resistance to high prices leading to an overall decline in domestic beef consumption.

The widespread drought and critical shortage of stock water in the early part of 1980 made cattle producers pessimistic about maintaining herds in the face of the high cost of production. The average monthly percentage of females slaughtered in the total adult cattle kill was approximately 58 per cent. Slight signs of herd rebuilding were indicated by the female slaughter figure of 48 per cent in May 1980. The proportion is normally about 40 per cent.

Statistics indicate that the total beef cattle herd has continued to decline from 6.7 million in 1977–8 to 5.8 million in 1978–9.

The impact of reduced cattle numbers and production is particularly evident at the abattoirs, where capacity to slaughter is double the current and predicted supply in some areas. The buoyant situation for wheat, sheep meats and wool would indicate that cattle numbers are likely to stabilize at lower levels than previously predicted. Prior to the drought, there had been an upsurge in capital expenditure on cattle yards and equipment, but this is expected to be less during 1980–1.

DAIRYING

The number of registered dairymen in New South Wales declined further and now stands at 3 601. This is made up of 3 424 milk producers and 177 cream producers. The number of dairy cattle has fallen from 492 000 in 1977–8 to 462 000 in 1978–9. Further statistics are published in the Annual Report of the New South Wales Dairy Authority.

The shortage of milk, which has persisted in the manufacturing sector for some years, continued in 1979–80.

A trend became evident during the year of a change in the attitude of dairymen remaining in the industry. Factory incentive payments and the Government's milk quota policy have given many dairymen in "outer" zones a greater degree of economic security than for many years. As a result, most districts have reported an increased receptiveness among farmers to innovations, labour-saving devices and management aids. The purchase of travelling irrigators, the installation of cableway grain-feeding systems and alterations to milking sheds to allow for quicker, more efficient milking became common during the year. There are also growing demands for farm-management advice, herd-recording services and instruction on do-it-yourself artificial breeding.

Seasonal conditions were generally favourable for dairying throughout the winter and early spring of 1979, but the summer was hot and dry, developing into a serious drought which affected almost every district.

PIGS

Pig numbers and pigmeat production increased during the year. Preliminary figures indicate that the State's pig population increased by 4 per cent from 759 000 in 1979 to 792 000 in 1980. Sow numbers increased by 17 per cent from 105 000 to 123 000, for Australia generally the percentage increase was 14 per cent. In the year ending June 1980 pigmeat production was 56 379 t, 3.6 per cent higher than in the previous year. Pigmeats comprised 8.5 per cent of total meat slaughtered in New South Wales.

Saleyeard prices reached the highest levels ever for the first six months of the year. The last six months showed a sharp drop of 25 per cent in prices.

Feed prices rose during the latter part of the year due to the widespread drought in late summer and autumn. All grains except wheat became unprocurable. Protein supplements continued to be highly priced compared to previous years.

POULTRY

Egg Production

The last six months of the year have seen a lowering of returns to egg producers. This has been largely brought about by increases in the price of layer feeds, which have risen by up to $36/t during the year.

An increase of 3 per cent was made in the hen quota allocation. Owing to an improvement in the production of laying strains and the need for farmers to increase efficiency, overproduction is becoming evident. Speculation that the quota increase would be higher than it was resulted in hatcheries rearing large quantities of started pullets. Consequently, the price of started pullets has dropped significantly. Farmers have taken advantage of the low prices and replaced flocks with pullets, causing an increase in the quantities of smaller-grade eggs coming onto the market.

There has been a trend for farms to be relocated to more outlying areas and for them to become highly mechanized as a result.

Most major hatcheries introduced new strains of layers onto the market during the year.

Animal welfare groups have been particularly active throughout the year, their main target of attack being the keeping of laying hens in cages.

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Poultry Meat Production

The Chicken Meat Industry Act is now fully operative. The price paid to growers by processors is determined by the Chicken Meat Industry Committee. It is now illegal for broiler chickens to be grown in batches of 1 000 or more except under a contract approved by the Committee.

Seriously high overproduction occurred towards the end of the financial year. This has caused processors to sell chickens for less than the cost of production to meet competition. It is expected that the situation will not ease until the end of 1980. This could have a disastrous effect, particularly on the smaller processors.

There has been a substantial increase in the production of game birds, particularly pheasants and quail. Supply of turkeys and ducks remains constant.

APICULTURE

The drought generally assisted the apiculture industry for most of the year. Most honey-producing species bud twelve months prior to flowering and hence bees worked most days. It is estimated that honey production was double that of the previous year.

Honey prices to producers have been relatively low and, as a result, there has not been a lot of new equipment purchased by apiarists.

The industry is concerned at rising fuel costs, fuel for the migration of hives being a major cost of production. Bee diseases have caused problems, particularly American brood disease and European brood disease. New South Wales beekeepers are now prevented by the Queensland Government from moving hives into Queensland, where European brood disease has not been found.

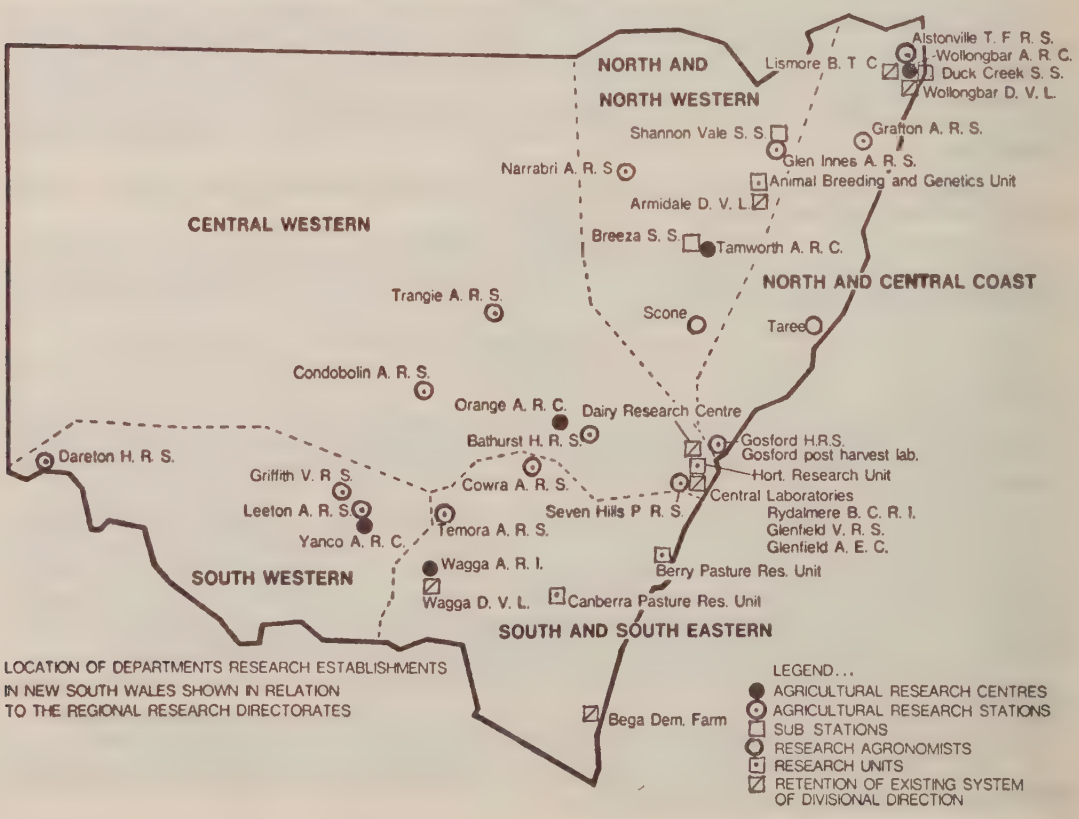
The projected biological control of Paterson's curse, the honey industry's most important ground flora crop, has caused southern beekeepers much concern. Important export markets for queen bees have been developed, the major importer being Iran.

Seed firms are showing increased interest in the use of honey bees for pollination of contract-grown oilseed crops in particular.

RESEARCH

RESEARCH ADMINISTRATION

New South Wales is divided into five regions for the administration of reasearch. The regions and the research units based in them are shown in Figure 1. The regional veterinary laboratories and the central laboratories at Rydalmere are not included in a regional directorate nor are the Veterinary Research Station, Glenfield or the Dairy Research Centre, Richmond.



Each Region is administered by a regional director of research. In addition, a director of research is located at Trangie and supervisors of research at Glen Innes, Narrabri, Gosford, Grafton and Condobolin Research Stations.

To meet State responsibilities, research is co-ordinated by research directors located with the Divisions in Sydney. At executive level, the Assistant Director-General is responsible for the overall management and control of the Department's research activities.

SUMMARY OF RESEARCH STAFF

Numbers of Staff Engaged in Research or Directly Supporting Research Activities

	Research	Technical Support	Managerial, Clerical and General Support	Total
North and Central Coast Directorate*	50	61	101	212
North and North Western Directorate*	50	59	77	186
Central Western Directorate	42	57	92	191
South and South Eastern Directorate*	38	55	51	144
South Western Directorate	27	27	67	121
Glenfield Research Units†	30	85	55	170
Biological and Chemical Research Institute, Rydalmere	64	68	53	185
Dairy Research Centre, Richmond	8	14	7	29
Head Office‡	35	17	41	93
	344	443	544	1 331

* Includes staff at regional veterinary laboratory.

† Includes Glenfield Veterinary Station, the Noxious and Feral Animals Unit, Drought Research Unit and the Agricultural Engineering Centre.

‡ Includes staff in the Divisional offices in Sydney, Biometrical Branch and officers based with CSIRO units in Sydney.

CROPS AND CROP PRODUCTS

WINTER CEREALS

Bread Wheat

In the Southern programme, the most promising lines in 1979 were M2145, a single backcross of Kite with similar grain quality, and M2453, one of a number of Teal backcrosses with the gene sr 26, conferring stem-rust resistance from Kite. Both varieties could be released for commercial sowings in 1982.

Avocet has been released as a replacement for Egret in the southern irrigation areas. Strains of stem-rust have developed which can attack Egret, but Avocet is resistant to all current races. In irrigation trials, Avocet equalled Egret with an average yield of 4.27 t per ha. Its characteristics make it slightly better for bread making than Egret but slightly inferior for biscuits.

In the northern programme, at Tamworth, a frost-resistant cultivar for Australia continues as an important aim. Severe frost stresses in July and August permitted selections to be made within early-sown breeding material. A late stress on October 14, 1979 damaged many commercial crops. Wide-scale regional testing of advanced materials will begin in 1980, following favourable results in 1979. Of 33 advanced lines to be evaluated, 30 were derived from the cross Kite/I.R.N.62.101/Festiguay.

Studies of the relationship between reaction of ears to radiation frost, as measured by grain set and temperature, revealed that there is a temperature range for each variety over which frost has no effect despite the presence of ice crystals covering the ears. Grain set was sharply reduced as temperature fell below a threshold. The transition from complete fertility to total sterility occurs over a transitional range of about 1° C.

Investigation of drought tolerance in wheat has shown that the relationship between leaf wilt and reduced seed set may involve the growth regulator, abscisic acid. This discovery opens up several further areas of investigation. Osmotic adjustment allows the plant to endure greater levels of stress before wilting. Significant differences in osmotic adjustment were found between breeding lines which are the F_3 progeny of a cross between a Condor derivative and Songlen, suggesting that the capacity for osmotic adjustment may be inherited.

Durum Wheat

The 1979 season saw the first full-scale commercial production of Durati, with 20 000 ha sown. Very heavy rain and hail at harvest time in the main producing area and/or the low availability of soil nitrogen were key factors in some disappointing grain quality. Breeding data from 1978 and 1979 seasons suggest that 4 advanced lines are potential replacements of Durati.

Breeding for Disease Resistance

Following the discovery last spring of the exotic disease, stripe rust, many crosses were made at Temora between local material and resistant introductions imported over the past two seasons.

When tested at Tamworth, using refrigerated glasshouse facilities, most of the recommended cultivars of bread and durum wheat for N.S.W. had adequate resistance to the current stripe rust strain, 104E 137.

A glasshouse-screening procedure developed at Wagga to determine the reaction of wheat and related plants to infection by *Mycosphaerella graminicola* confirmed the generally superior resistance of triticales to the speckled leaf blotch disease caused by this pathogen.

Wheat Agronomy

Comparisons of 117 new cereal lines at Trangie from breeding programmes throughout eastern Australia showed that several new lines could increase irrigated wheat yields in the Macquarie Valley by approximately 20 per cent. Triticales also have excellent potential under irrigation.

Wheat yields were increased by 78 per cent by fumigation of the soil with methyl bromide, in an experiment to determine the cause of declining wheat yields on black soils in the Gunnedah area. Control of nematodes is a likely cause of the yield increase.

Direct drilling resulted in significant yield increases over conventional methods on the south west slopes in spite of very dry conditions at, and after, sowing and serious infestation of couch grass which made drilling difficult. The number of growers involved in direct drilling demonstrations doubled and the area sown trebled in 1979.

Long fallow (8 months) again gave much higher wheat yields than short fallows in the central west. Stubble retention gave higher wheat yields than stubble burning on red soils, particularly where seed was drilled into the stubble without cultivation.

Barley

Cutter, an attractive feed grain barley variety, was registered jointly with the Waite Agricultural Research Institute. This is the first barley registered for N.S.W. for more than 25 years. It will be recommended for northern and central areas.

Oats

Two promising crossbreds which have been tested in State-wide trials for a number of seasons are to be proposed for release. Both are dual-purpose varieties intended for early sowing and heavy grazing.

Acid Soil Tolerance

A range of plants have been screened at Wagga to identify tolerance to high levels of manganese and/or aluminium. All Australian varieties of wheat tested are susceptible to aluminium damage.

SUMMER CEREALS

Rice

YR 303D, a new, long grain selection has performed well this past season and may be a possible replacement for Inga. It is less susceptible to cold-weather-induced sterility and is high yielding with good appearance, mill out and cooking characteristics.

Two YR 303D-5 lines performed well in variety trials and showed considerable tolerance to low temperatures during reproduction. They have acceptable milling quality and grain appearance at least equivalent to Inga. Milling quality did fall to unacceptable levels when they were harvested at very low moisture contents.

Rice sod-seeded into pasture gave higher yields than when established by conventional drilling.

Sub-clover and barrel medic varieties grown between continuous rice crops did not increase the yields of rice.

Maize

Experimental hybrid, GH 5006, continued to produce high yields of grain at Grafton and in district trials and will be finally assessed in the 1980–1 season. At Grafton, without irrigation, a new experimental hybrid GH 5009, produced 11.9 t per ha and GH 5006 produced 10.1 t per ha; the best of 11 commercial hybrids yielded 9.2 t per ha.

FIBRE AND OIL CROPS

Cotton

A study of cotton root growth aims to establish what effects changes in soil structure have on root growth and to quantify measures for improving the recovery of soil water.

In an irrigation study, extension of the period of inundation from 4 to 16 hours reduced cotton lint yields by over 8 per cent. The reduction was largely associated with reduced boll numbers per unit area. Yield of cotton was shown to be related to the pre-season soil nitrate level.

Rapeseed

The blackleg resistant line of *Brassica campestris*, BLC1, yielded up to 4 times more than the commercial variety Span, when blackleg was present and will be used as a breeding line.

GRAIN LEGUMES

Soybeans

Dickie, a new cultivar of soybeans was released as a result of co-operation between the New South Wales Department of Agriculture and the University of Sydney. Dickie is recommended as an alternative to Bragg in the Namoi and Gwydir Valley Irrigation Areas.

A disease of soybeans, caused by *Phytophthora megasperma* var. *sojae*, was reported for the first time in New South Wales.

Drought resistance of 40 early-maturing lines was investigated at Narrabri. At least one selection from the cross Calland x Williams was substantially better adapted than either of the parents. This result holds promise for the further development of dryland production.

The research programme on soybeans at Grafton has developed direct drilling techniques which support a strong diversification into cropping on traditional beef properties.

Chickpeas

The F4 stage of the breeding programme was successfully completed. Earliness and tall plant stature have been incorporated in one genotype. Many F4 families, characterized by this recombination, yielded better than a high-yielding control variety, in single row tests. The culinary chickpea line, CPI 56563, has been released under the name of Opal. Yields of chickpea compared well with those of lupin in trials at Trangie except when sown early on heavier soils, where Phytophthora root rot was a problem.

Lupins

Evaluation of varieties of *Lupinus albus* showed Hamburg, which is widely promoted in other States, to be inferior to Ultra, the recommended variety for this State.

The increase in yield of wheat following a lupin crop grown the previous year was equivalent to that obtained by applying 80 kg and 40 kg of fertilizer nitrogen respectively in experiments near Coonabarabran and Gunnedah.

Other Grain Legumes

A new variety of adzuki beans was released during the year under the name of Bloodwood.

PASTURES

Species Breeding

The spotted aphid resistant lucerne variety, Nova, was released in 1979. The arrival of the pea aphid has emphasized the need to breed multiple-pest resistant varieties.

Species Evaluation

Many of the introduced aphid-resistant varieties of lucerne, including several winter-active lucernes bred for hay production in California, have withstood grazing and drought conditions for at least three years. In some areas, mainly the coast and the Hunter Valley, the winter-active varieties have produced the best yields but at other sites, such as Tamworth, there were no differences.

Establishment

In the Hunter Valley, sowing rate had very little effect on final numbers of lucerne plants in irrigated stands. More than three-quarters of the plants died at a seeding rate of 10 kg per ha and over half and one-third of the plants died at sowing rates of 5 and 2.5 kg per ha respectively.

Nutrition

The growth of medics and subterranean clover on central western soils was studied in pots. Sulphur improved the growth of medics on red soils and of subterranean clover and barrel medic on gradational red earth by 113 and 79 per cent respectively. Field results have been generally negative.

Studies on the variation in soil phosphate with lime have shown that Olsen P values can vary up to 100 per cent within a season at any given site. This variation occurs on a wide range of soil types and is related to soil moisture levels and pasture growth.

The potassium status of many north coast soils is low initially and may be further reduced by applications of superphosphate. At the end of the fourth year of a maintenance potassium experiment, maximum liveweight response of animals occurred at 350 to 400 kg per ha KCL. This effect was recorded when the exchangeable soil potassium level was 150 ppm.

The effect of adding lime to acid soils continued at a number of southern centres. In a dry year, despite significant effects on soil pH and the reduction of aluminium availability, there was little improvement in pasture growth.

Pasture Management

At Grafton a new project was commenced to attempt to increase the efficiency of fertilizer usage and to evaluate different pasture systems for fattening beef cattle.

At Tamworth, grazing at high stocking rates with either sheep or cattle over summer reduced dry matter production, the abudance, and seed yield of the summer-growing native perennial grass, *Aristida ramosa* (Wiregrass).

After two years of grazing or cutting for hay there is little apparent difference in the total production of lucerne varieties in different dormancy classes; grazing also had little effect on plant frequency.

WEEDS

Weeds research at Tamworth concentrated on a no-till project. Preliminary observation trials indicated that successful wheat crops could be grown without tillage. Yields of grain sorghum were increased by 23 per cent on no-till plots, using atrazine as a fallow aid and an in-crop herbicide. Emphasis was placed on developing a suitable no-till planter, a pre-requisite for success.

There is growing recognition of the importance of silverleaf night-shade in the southern part of the State. Research at Wagga indicates that controlled droplet application of glyphosate gives 20 per cent better control than high volume sprays.

A method to determine the distribution of *Xanthium* spp., based on examination of wool samples on display at wool-selling centres, yielded better results than obtained by a questionnaire. Maps of New South Wales are being prepared which will show the proportion of properties in each Wool Statistical Services District with wool contaminated with Bathurst or Noogoora burr.

Pot trials at Yanco Research Centre have confirmed that MCPA can cause retardation of secondary root development of rice, when used at the recommended time and rate of application. The effect is similar to snail damage.

Successful control of cumbungi in rice has been achieved using glyphosate and amitrol applied through various designs of rope weeder.

Results of research at Wagga which examined the differential effect of herbicides on wheat varieties is causing companies to change many of their current recommendations on the labels of their products.

HORTICULTURE AND HORTICULTURAL PRODUCTS

CITRUS FRUITS

Salinity and Irrigation Management

In irrigation trials on mature orange trees at Dareton over two seasons it has been demonstrated that micro-irrigation systems offer a practical alternative to conventional full ground-cover systems for the irrigation of tree crops. Using micro-sprinklers savings in water application of about 20 per cent have been recorded, with no increase in soil salinity appearing within the root zone. This economy is combined with lower capital and energy costs and the possibility of applying fertilizer directly to the wetted part of the root zone. With saline irrigation water a further advantage of under-tree sprinklers is the reduced foliar uptake of salt by an average of 30 to 50 per cent compared with overhead sprinklers.

Citrus Improvement—Rootstocks and Varieties

A hybridization programme to develop new citrus rootstocks was carried out between 1959 and 1965 using *Poncirus trifoliata* as male parent and Cleopatra mandarin, Scarlet mandarin, smooth Seville orange, Eureka lemon, rough lemon, Ellendale tangor, Meyer lemon, Rangpur lime and Wheeny grapefruit as female parents. Three hundred of the resultant hybrids which showed some resistance to *Phytophthora* root rot were budded on to rough lemon and planted at Gosford. Second generation seedlings have been selected for uniformity and the more promising hybrids are being screened for *Phytophthora* resistance, salinity tolerance and virus status in their evaluation as potential rootstocks. New selections were introduced from China this season following a visit by Australian scientists to citrus producing regions in that country.

In a lemon variety and rootstock trial planted at Gosford in 1971 and 1973 a range of scions and rootstocks are being evaluated to determine suitable combinations for replant situations. To date Taylor Eureka and Prior Lisbon have produced compact trees on smooth Seville orange stock which are cropping satisfactorily. In the younger section of the trial highest yields of Taylor Eureka have been achieved on rough lemon, red rough lemon and Benton citrange rootstocks. Trees on the latter two stocks are smaller than those on rough lemon but show high cropping efficiencies. Prior Lisbon on trifoliata is a small compact tree with acceptable efficiency and could be planted at high density.

Citrus Dwarfing and Plant Density

In trials at Yanco, dwarf inoculated orange trees, planted at 864 trees/ha in 1963 and 1964, have produced similar yields to vigorous normal planted uninoculated trees on citrange rootstocks. At 15 years of age the dwarf trees had significantly outyielded the conventional square planting in both annual and cumulative yields. Cumulative yield for the best strains of high density planted dwarf navels was 416 t/ha compared with 215 t/ha for uninoculated single spaced trees on *P. trifoliata*. The equivalent yield figures for Valencia were 324 and 165 t/ha. Dwarf inoculated Valencia orange trees on *P. trifoliata* rootstocks planted at Yanco in 1973 at 2 x 1 m spacing have a cumulative yield of 205 t/ha, compared with 56 t/ha for trees spaced at 5 x 3 m. Closely planted uninoculated trees have also yielded well (e.g., 2.5 x 1.5 m yielding 178 t/ha) but tree crowding is apparent.

Citrus Nutrition

Differential fertilizer treatments incorporating nitrogen, phosphorous and potassium have been applied since 1970 to Valencia oranges on Troyer citrange and sweet orange rootstocks under permanent overhead spray irrigation at Dareton. After eight years cropping the most economic combination of fertilizer application rates for production of early season fruit on Troyer rootstock has been 75 kg N/ha, 30 kg P/ha and 60 kg K/ha, which is close to the present district fertilizer practice and has yielded 43 t/ha/year. However, higher rates of fertilizer are required to maintain yield and fruit quality in late hanging fruit. The trial has emphasized the need for balanced applications of nutrients to ensure satisfactory production and quality.

Post-harvest

Guazatine (Panoctine ®) has been registered for use as a post-harvest treatment against *Penicillium* moulds and sour rot of citrus fruits and has given good control of benzimidizole resistant strains of mould. Two other experimental fungicides have also shown promise for wastage control in screening and semi-commercial tests.

STONE AND BERRY FRUITS

Peach Trellising and Training

Five training systems are being compared for effects on production and fruit quality of Redhaven and Coronet dessert peaches at Bathurst. After two commercial crops, trees trained as palmettes have been the most productive in terms of marketable fruit. Although the Tatura trellis has produced heavy crops on an area basis small fruit size has resulted in lower market returns. The Lincoln canopy has produced uniformly coloured fruit of good size. For canning peaches at Yanco the M.I.A. trellis system has given significantly increased early productivity and higher canning yields compared with the Tatura trellis and hedgerow production systems. The M.I.A. trellis also appears to be the most suitable for most mechanical operations including spraying, pruning and harvesting.

Rootstocks

Apricots grown on plum rootstocks rather than seedling apricot may have several advantages such as higher resistance to waterlogging and increased vigour. Buck plum has consistently yielded better than apricot seedling as a rootstock for Trevatt and Morocco apricots in a trial planted at Yanco in 1968.

Strawberries

Selection and testing of seedlings to produce new varieties continued at Gosford. Selections 78/6 and 78/19 again yielded well in comparison with Torrey and Naratoga and will be further evaluated. Berry quality of selection 78/19 was outstanding, showing excellent size, texture, flavour and firmness. New selections, including day-neutral types, were introduced as seed from South Africa and U.S.A. for testing.

POME FRUIT

Rootstocks, Tree Training and Spacing

Four tree training systems for apples, vase, Hawkes Bay, pyramid and palmette, are being compared at Orange. The planting includes the three apple varieties Delicious, Jonathan and Granny Smith on MM.106, MM.102, Northern Spy and seedling rootstocks planted between 1969 and 1971. By most measurements the pyramid has given the most efficient fruit production of all varieties regardless of rootstock.

Post-harvest

Several years of investigation in New South Wales, other Australian States and New Zealand have shown that excellent control of bitter pit and apple breakdown can be achieved with post-harvest applications of calcium chloride. Vacuum or pressure infiltration was best but simple dipping of fruit in calcium chloride solution was also often effective. Commercial development of the process for closed calyx varieties such as Cox's Orange Pippin and Granny Smith is in progress. However, varieties with an open calyx often take up excessive solution and suffer internal damage. Attempts are being made to overcome skin injury problems which sometimes occur with the dipping treatment.

In screening trials, two experimental fungicides have shown promise for the control of *Penicillium expansum*, causing blue mould on apples and pears, and if approved, would appear to be suitable alternatives for benzimidazole fungicides which are now ineffective against tolerant strains of the pathogen.

Following extensive tests at Gosford with Queensland fruit fly larvae in artificially infested apples the U.S.A. plant quarantine authorities approved cold sterilization treatments for entry of Australian fruit of 22 days storage at 2.5° C or 18 days at 1.5° C as alternative treatments to those previously specified at lower temperatures.

TROPICAL FRUITS

Bananas

Defoliation at particular stages of growth is being investigated at Alstonville in an attempt to spread banana production more evenly throughout the year. It has been demonstrated that complete defoliation of the plant crop at the 15 to 25 leaf stage will delay bunch harvest by 5 to 7 weeks, irrespective of the time of year when the fruit is harvested, and offers a practical means of crop control.

Ureaform, a slow release nitrogen fertilizer, applied annually does not appear to be maintaining banana yields compared with sulphate of ammonia applied four times each year. In other trials bananas have responded more to nitrogen in the nitrate form than to ammonia, but the implications of this work in plantation fertilizer management have yet to be explored.

Avocados

In the avacado root rot management trial established in 1973 at Alstonville the cover crop plus gypsum treatment has consistently shown the highest yields. However, there has been no marked effect of treatments on the incidence of *Phythophthora cinnamomi* in the planting.

Other Tropical Fruits

Yields from guava clones have been outstanding with the most productive selections yielding almost 60 t/ha in the second year of cropping. Defoliation-induced flowering resulted in a shortened harvest period to only three weeks for most selections with little problem in fruit fly control.

Thirty-seven new species and varieties of tropical and subtropical fruits have been planted at Alstonville in the last two years.

GRAPES AND WINE

Wine Grape Varieties and Clones

Testing of imported and new wine grape varieties continued. The hybrid Chambourcin produced an exceptionally high coloured red wine along with Durif and Cabernet Franc. The white varietals were also most significant with wine from the high yielding Farana only slightly inferior to Semillon. Of particular interest were the big bunched white varieties Parallado, Jaen and Verdal, which have a high yielding potential but are probably suitable for spirit production only.

The imported French Malbec clone, INRA 1056 has given consistently high yields and good quality fruit but in recent seasons the Western Australian clone has also performed well. The Swiss Mariafeld clone of Pinot Noir remains an outstanding selection of this variety but in recent seasons has been outyielded by a Californian selection FVD4V2. However, wine made from Pinot Noir has been generally unacceptable as a commercial wine, showing poor colour and very pronounced astringency.

Cumulative yields over seven years show that J2 and E4 clones of Muscat Gordo Blanco have outyielded all other clones selected from Sunraysia and other areas. Of currant clones the heat-treated clone from the University of California, Davis, has been the most promising.

Nematode Resistant Rootstocks

Yields of Cabernet Sauvignon, Shiraz, Muscat Gordo Blanco and Semillon have all been significantly increased by growing the vines on rootstocks such as Ramsey (formerly Salt Creek) and Dogridge compared with vines on their own roots.

Pruning and Trellising

Improved trellises have increased table grape quality and reduced overall costs of production compared to vines grown on a single wire trellis. The effects of different pruning and trellising treatments on Shiraz and Semillon were similar to results in previous seasons. For Shiraz the best treatments were wide T trellises with foliage wires, pruned to spurs and 75 nodes per kg of pruning weight. For Semillon the highest yields were obtained from vines on a wide T trellis with little effect on pruning level.

For the first time, late pruning failed to improve grape acidity, probably because of the high acidity in fruit from normally pruned vines this season. Late pruning after mid-October caused a heavy reduction in yield.

VEGETABLES

Potatoes

Using Sebago, Katahdin and Maramba as standard varieties advanced seedlings from the Glen Innes breeding programme have been trialled in sandy soils at Yanco. Eighteen lines were selected for further testing which had at least yielded as well as Sebago. Selection S3041 outyielded Sebago by 20 per cent but appears to mature about ten days later. Irrigation studies on the sandy soils at Yanco have demonstrated that potato crops would require daily irrigation under conditions of peak summer demand.

Tomatoes

Three promising cultivars of processing tomatoes, suitable for whole peel production emerged from the evaluation programme being conducted at Cowra and Yanco. The three cultivars K295A bred by the Victorian Department of Agriculture, Hypeel 229 bred by the Peto Seed Company and PU79/58 from Purdue University were superior in both yield and processing quality compared to the current standard, VF Napoli.

Fresh market tomato varieties with potential for adequate fruit set during late autumn, winter and early spring are being evaluated on the north coast of New South Wales in comparison with commercial lines of Rouge de Marmande.

Post-harvest

A new treatment for control of post-harvest wastage in rockmelons was released for use by the industry during the 1979–80 season. Melons are dipped promptly after harvest in a mixture containing benomyl and guazatine. This treatment controls the market-disease complex of rockmelons and gives the fruit a shelf-life of about a week at ambient temperature. Use of this procedure obviates many of the difficulties previously encountered in the marketing of fully-mature melons, which otherwise have a short shelf-life.

ORNAMENTALS

The family *Proteaceae*, in particular Proteas, Banksias and *Telopea* (Waratah), are being examined for their suitability as ornamentals. Although most have been not found suited to the Gosford area, some show promise. Selections of *Telopea* have also been made which appear to be more reliable in cultivation and more vigorous than the vast majority of seedlings.

Research is continuing in relation to potting media and fertilizers especially in relation to container production of citrus. Emphasis is being placed on sawdust based media and slow release fertilizers.

The irrigation requirements of container grown plants when transplanted to the field are being examined. Results to date indicate that different species and container sizes have widely varying requirements and that watering frequency is the main factor determining the survival and establishment of plants in the field.

LIVESTOCK AND LIVESTOCK PRODUCTS

ANIMAL PRODUCTION RESEARCH

Research in the Division of Animal Production is conducted by 47 livestock research officers located at agricultural research stations and centres throughout the State. Their programmes are supervised by the Director of Animal Production Research and the Regional Directors of Research.

Production research is undertaken on all of the major livestock species (sheep, cattle, pigs and goats), on the biology and control of noxious and feral animals and in a number of areas is related to production quality.

Sheep Genetics

At Trangie Agricultural Research Station considerable genetic variation has been found among Merino strains and bloodlines for such characters as fleece weight in reproductive performance and resistance to fleece rot and fly strike. The 15 bloodlines included in this comparison represent all of the major strains within the Australian Merino population. Within these bloodlines, resistance to fleece rot and fly strike was shown to be heritable so that selection for increased resistance to these characters should be successful. The consequences of such a selection programme are under test.

Sheep Reproduction

At Cowra Agricultural Research Station a programme has been initiated to develop a prime lamb producing ewe suitable for intensive production systems by grazing highly fertile Merinos with Dorsets. Subsequent selection will emphasize the year-round breeding ability, a short lactational anoestrous period and high litter size.

Ewe reproductive performance is an important factor influencing the productivity and profitability of both wool and lamb producing flocks. Studies on intensive lamb production have begun at Leeton Agricultural Research Station where ewe flocks are joined approximately 3 times in any two-year period. The reproductive activity of the ewes is both synchronized and stimulated using appropriate hormonal treatments and is associated with a system for artificially rearing lambs when a ewe gives birth to more than two at any one lambing. Over a two-year period the ewe flocks in this programme have averaged 196 per cent of lambs born per ewe per annum.

Research at Trangie is examining the nutritional requirements during pregnancy of twin-bearing Merino ewes relative to those of single bearers. When the feed offered during pregnancy is not limited there is little difference between the wool production and body weights of single and twin-born progeny. However, if feed during pregnancy is restricted, the growth and wool production of the twin-born lamb is adversely affected even when plentiful feed is available after lambing.

The ability to identify correctly twin-bearing ewes before the critical last six weeks of pregnancy would be an important step towards the successful management of a highly fertile flock. A range of ultrasonic equipment is currently under test at Glen Innes Agricultural Research Station to identify twin-bearing ewes.

Carpet Wool

Although Australia has a carpet yarn spinning and carpet manufacturing industry it has traditionally imported most of the wool used in these processes. To exploit this market several groups of producers have imported mutant Romney sheep from New Zealand and are breeding these to increase the proportion of carpet wool producing sheep in their flocks. The carpet wool character is determined by a single gene, and research on a number of commercial properties in the central tablelands is attempting to identify rams homozygous for this gene and hence true breeding for the carpet wool characteristic. Other studies are endeavouring to define levels of carpet wool production which can be achieved under grazing conditions and to describe the effects of environmental and genetic factors on the weight and quality of carpet wool produced.

Pigs

In Australia most diets fed to pigs are based on cereals, commonly wheat, barley or sorghum supplemented with a protein concentrate. Most of the available cereals and protein concentrates have a low lysine status so that lysine is normally the first and major limiting dietary amino acid.

The availability of lysine in protein concentrates has been examined at the Wollongbar Agricultural Research Centre in association with studies to establish the efficient use of synthetic lysine additives. These studies have highlighted the inadequacy of some commonly used assay procedures for determining lysine levels in feeds and the need to determine the amount of lysine actually available to the pigs. The efficient use of added synthetic lysine is most readily achieved by frequent or *ad lib* feeding rather than by once-daily feeding.

Poultry

The effects of heat stress on hens and egg production is being studied at Seven Hills Poultry Research Station by monitoring panting, wing spreading and heat prostration. The proportion of birds panting proved the most useful measure of heat stress. Forced air using low speed ceiling fans in conjunction with the wetting of birds from spray nozzles at cage level appears to be effective in reducing heat stress.

Beef Cattle

A range of nutritional studies have been undertaken to improve beef cattle production under grazing conditions.

At Glen Innes the value of protein meal supplements in association with added minerals was studied during winter and spring. Over the five-month period heifers given the protein supplement grew at 500 g per day while heifers given only minerals lost weight. Three months after the end of joining, 92 per cent of the protein-supplemented heifers were in calf compared with none of those receiving only mineral supplements.

At Grafton a number of studies have been undertaken to improve production from carpet grass pastures. Several which examined the effect of phosphorous supplements on growth of beef steers and breeding cows showed that phosphorous cannot be considered as an isolated nutrient and panacea for ill-thrift and infertility of cattle grazing poor quality pastures. Grazing trials showed that infrequent dressings with superphosphate may maintain beef production from naturalized white clover/carpet grass pastures. It may therefore be sound management to apply superphosphate when beef prices are high and utilize the strong residual effects when low beef prices preclude useage of superphosphate.

Cross-breeding studies have continued at Grafton and Duck Creek Research Stations and on commercial properties and confirmed previous results that Brahman x Hereford steers and heifers grow more rapidly than pure-bred Herefords under adverse conditions for growth. A similar picture is developing for reproductive performance. At low levels of nitrogen, 74 per cent of Brahman x Hereford cows calved compared with 57 per cent for Herefords at high levels of nitrogen. The differences between groups were negligible.

Dairy Cattle

At the Dairy Research Centre, Richmond, research is continuing on the use of hormone levels in milk measured by radio-immunoassay to predict a cow's subsequent lactational performance. This is a development of previous work in which milk hormone levels were used to monitor the physiological response of cows to machine milking and to improve our understanding of the mechanisms involved in the maintenance of milk secretion.

A major review was undertaken of previous dairy nutrition research in New South Wales and the need for further studies.

Goats

The role of feral goats in weed control is being studied on commercial properties in the Central Tablelands of New South Wales. Studies are also under way to improve the production of meat and cashmere. At Condobolin Agricultural Research Station, attempts have been made to improve meat production by both cross-breeding and selection. In trials on commercial properties the production and quality of cashmere is being monitored in conjunction with field trials of the cashmere combing machine developed by the Agricultural Engineering Centre, Glenfield.

Noxious and Feral Animals

The efficiency of various rodenticides and baiting methods for mice have been examined, both at the Veterinary Research Station, Glenfield and in field trials. This programme has identified the most suitable cereal grains for use as baits and studies are now directed towards increasing the acceptability of the baits by the use of natural additives and/or artificial flavours.

Research on feral pigs has also focused on baiting methods using 1080 as the poison. These have included pig cubes, rabbit pellets and wheat and sorghum grain. A study has begun at Trangie Agricultural Research Station to examine the efficiency of different types of fencing to control pig movements. A fence which successfully excluded pigs from paddocks containing lambing ewes would be of considerable value as feral pigs have gradually reduced lamb marking percentages in some situations.

Product Quality and Control

At the Dairy Research Centre, Richmond, research has continued on cleaning systems for milking machines. A number of systems developed overseas have been evaluated in commercial dairies as alternatives to the triple system using iodophors first recommended to the industry in 1966. Two systems are particularly promising; one based on acidified boiling water and another which involves an acid/alkali wash. The performance of both will be monitored as they are implemented in the industry. Further developmental research has been undertaken on low energy washing procedures where the cleaning agents do not require heat.

LIVESTOCK DISEASES AND DISORDERS

Studies of Vitamins A and E in Sheep

Sheep on conventional feeds such as pasture and sown crops, etc., receive ample supplies of vitamins A and E. However, when hand fed, especially during times of drought, the intake of these vitamins can be low due to the small amount present in grain and many types of hay.

Suitable methods to analyse for vitamin A in liver and blood plasma and for vitamin E in liver, feed and blood were developed and published. The usefulness of biopsy diagnosis was also investigated.

The normal levels of vitamins A and E in liver and blood of sheep grazing green feed were determined. Similar measurements were made on sheep fed on drought feed rations and low to very low levels were found. Plasma vitamin A was not a good indicator of body reserves as it was often maintained at fairly normal levels until liver reserves were almost depleted. Other observations showed a good relationship between vitamin A and the occurrence of night blindness. A simple test for night blindness of sheep could have possibilities as a practical means of determining the status of the sheep.

When sheep of reasonable vitamin A status were treated with vitamin A in varying doses and at different frequencies there was only a transient effect on plasma vitamin A but a more prolonged effect on liver vitamin A. However when deficient sheep were given vitamin A, both plasma and liver levels were raised and the effect persisted for varying periods according to the size of the dose and the vitamin status of the animal. The effects of dosing with vitamin E were also studied, on both the vitamin E status of the sheep and on the relationships between vitamin A and vitamin E.

Investigations on Some Poison Plants

A very wide range of plants can be poisonous to stock. Poisoning can occur when stock are forced to feed on particular plants because of the unavailability of other feeds. Three such cases have been the subject of recent research:

Fireweed (*Senecio lautus*)

Fireweed has become an important weed in pasture, particularly on the coast. Field Investigations, especially in the Hunter Valley, have shown that it can cause reduced growth rate in cattle and death of beasts of all ages. Pathological changes in affected animals indicated that death was due to liver lesions caused by the pyrrolizidine alkaloid in fireweed. Confirmation of the cause was obtained at the Veterinary Research Station, Glenfield, in which the condition was reproduced by feeding fireweed to calves. Liver biopsy is the most sensitive method of diagnosis when it is suspected in the field.

Plains Plover Daisy (*Ixiolaena brevicompta*)

Extensive mortalities in sheep have occurred periodically on properties along the Darling River in the Wilcannia area. Detailed investigations indicate that plains plover daisy was the cause of the symptoms, namely reduced exercise tolerance, weakness, recumbency and death. The most prominent lesions found at autopsy were dystrophic changes in the muscles which were compatible with the clinical signs. The disease only occurred when sheep were forced to eat herbage in which mature-seeded *Ixiolaena brevicompta* predominated.

Patterson's Curse (*Echium lycopsis*)

Observations were made on a number of deaths in horses in the central west of New South Wales. These deaths were attributed to the ingestion of Patterson's curse. Affected horses showed a loss of condition, listlessness and sometimes neurological signs. At autopsy the main lesions were in the liver and these were typical of pyrrolizidine toxicity.

Keratoconjunctivitis in Koalas

A "pink-eye" type of disease has been known in koalas since last century. Large losses of koalas have been attributed to epidemics of the condition but there has been little defined information about the disease and no knowledge of its cause. The condition was studied, in conjunction with officers of the National Parks and Wildlife Service, in koalas running under natural conditions and also in sanctuaries.

The casual agent was identified as *Chlamydia psittaci*, a rickettsial organism which was recovered from many affected koalas; such koalas had produced serum antibody to the organism. Possibilities for treatment are fairly limited; some response was obtained to tetracyclines.

Inherited Diseases in Cattle

Diagnostic tests for the detection of carriers (heterozygotes) of Pompes disease were developed during the year.

A project to study the inheritance and pathology of neuraxial oedema has been initiated following many field reports of the condition in cattle.

BIOLOGY

Diseases of Cereals

Stripe rust of wheat, a serious disease in cooler climates overseas, appeared in Australia for the first time in spring 1979. Its spread was monitored by officers of Biology Branch and the University of Sydney and it now occurs throughout the south-eastern Australia wheatbelt as far north as Tamworth. Observations in 1979 suggested that many Australian wheat cultivars may already possess useful resistance. However new races of the fungus may develop which can attack previously resistant material; thus the future of existing cultivars is uncertain. The Biology Branch is co-operating with the University of Sydney in identifying races of the rust in Australia and a plant pathologist is to be seconded to that university to study the genetics of the relationship between the stripe rust fungus and the wheat plant.

A model to predict disease severity incorporating rainfall and other weather parameters is being developed. During spring an epidemic of speckled leaf blotch commenced earlier on early-maturing than on late-maturing cultivars but the disease reached a similar level at each stage of post-maturity regardless of whether this occurred early or late. Cultivars may be grouped according to their disease progress curves. The curves of cultivars derived from the Mexican plant WW 15 developed after that of many other Australian cultivars and the curve for the less susceptible cultivar, Teal, developed even later.

The current trend to direct drilling and minimum tillage of cereals is accompanied by a change in the incidence and type of disease attack. In southern New South Wales there is a higher incidence of take-all disease in wheat seeded directly into undisturbed soil compared with that in wheat seeded into a conventionally prepared seedbed. In northern New South Wales where direct drilling is a more recent venture, yellow leaf spot incidence has been increased by management systems which retain wheat stubble on or above the soil surface. In one experiment at Tamworth the yield of the cultivar Cook, which appears highly susceptible to yellow leaf spot, was increased by 55 per cent by application of fungicidal sprays.

Research on the biological control of wheat take-all has continued at the Agricultural Research Centre, Tamworth. Protection of wheat from take-all attack, by prior colonization of the roots with non-pathogenic strains of take-all or other related non-pathogenic fungi, increased yields to within 15 per cent of healthy wheat plants; unprotected wheat yielded only half as much as healthy wheat. This is the first time that biological control of take-all has been demonstrated convincingly in the field. Research is continuing, to develop techniques of exploiting these findings on a large scale.

Diseases of Lucerne

Most imported aphid-resistant lucerne cultivars have now been screened in the glasshouse for their reaction to Phytophthora root rot and Colletotrichum crown rot. Techniques are being developed in co-operation with lucerne breeders to screen for resistance to other major lucerne diseases. Continued surveys have also established the widespread occurrence of crown rot (*Stagonospora meliloti*) and have shown that bacterial wilt (*Corynebacterium insidiosum*) is present in coast and tableland areas as far north as the Hunter Valley. Leaf spots, particularly pepper spot (*Leptosphaerulina trifolii*), are economically important on the winter-active cultivars introduced from overseas.

Diseases of Cotton

Research on Verticillium wilt of cotton in the Namoi Valley has enabled losses from the disease to be measured by relating wilt epidemics of varying intensities to crop yields. A level of 16 infective units (sclerotia) of the causal fungus per gram of soil can cause an 8 per cent yield loss. This represents $151 ha (based on an average yield of 5.4 bales ha @ $350 bale) but to this must be added the loss in lint quality. Methods of measuring wilt levels and assessing yield loss will assist cotton breeders in screening genetic material for reaction to wilt.

Diseases of Grapes

Study of the environmental relations in the epidemiology of grapevine downy mildew indicates a minimum damp period of 2.5 hours is required for infection to occur at 15° C compared with 2 hours at 25° C. At 15° C 3.5 hours is required for heavy infection compared with 3 hours at 25° C. Between 15° and 30° C the least latent period of the fungus in leaves, of 4 to 7 days prior to spore production, is relatively unaffected by the temperature. Temperatures below 15° C significantly lengthen the minimum latent period. Usually spore production in the first day of an infectious period is light, with heavy spore production usually following in a further 1 to 2 days.

Diseases of Avocados

The expansion of the avocado industry in New South Wales in recent years has increased the demand for propagating material free of the sunblotch disease viroid. Previously used techniques could require up to two years to index this viroid. A new biochemical test has reduced this period to 1 to 2 weeks. This technique is now used to index avocado propagating material and will allow more extensive testing of existing plantations to determine whether symptomless carriers of sunblotch are present.

Diseases of Citrus

Research on the reaction of major citrus rootstocks to the citrus nematode (*Tylenchulus semipenetrans*) has shown that *Poncirus trifoliata* is highly resistant. Symonds sweet orange is less resistant; Cleopatra and Scarlet mandarins, Troyer and Carrizo citranges and rough lemon were very susceptible.

Diseases of Potatoes

Certified potato seed produced in New South Wales was examined for the presence of viruses and the powdery scab fungus (*Spongospora subterranea*). Tubers from 79.5 per cent of crops sampled contained potato virus X. Powdery scab was not found on any of 152 seed samples examined. Great care was taken to check tuber lenticels for the fungus as infections of lenticels have been reported from outside New South Wales, The survey covered all certified seed producing areas of the State and indicated that soils on which certified seed potatoes are permitted to be produced have remained free of powdery scab.

Two bacterial pathogens *Erwinia chrysanthemi* and *E. carotovora* var. *carotovora* cause seed piece breakdown and reduced stands in autumn-sown potato crops in south-western New South Wales. An average loss of 30 per cent occur. *E. chrysanthemi* is by far the more aggressive pathogen, a unique situation, in that *E. chrysanthemi* has not been found to cause seed piece rotting elsewhere in the world. Research is aimed at reducing seed piece rotting.

Disease Management

Plant disease scouting, a method of disease management practised overseas, under various names, for a number of years, was commenced in New South Wales during the 1979–80 season. Scouting documents the build-up of a disease during the growing season and allows timely warnings and appropriate control measures to be given to growers. When systematic disease scouting is practised over a number of years, information is accumulated, which, on analysis, can be used as a basis for disease forecasting to forewarn growers of disease outbreaks so that effective control measures can be taken before a disease reaches epidemic proportions. At present, gravepine downy mildew and prune rust are being scouted in New South Wales.

Systematics

The Biology Branch Herbarium (Herb. DAR) now contains over 50 000 specimens. Over 1 600 specimens were added during the year. An increased number of specimens is being received from other States. In particular, holdings from Tasmania have increased markedly and these have been used in a co-operative project with the Tasmanian Department of Agriculture in the preparation of a check list of plant diseases for that State. The resources of the Herbarium proved particularly valuable during 1979–80 in enabling the rapid identification of two important new plant dieseases in Australia—stripe rust of wheat (*Puccinia striiformis*) in New South Wales and downy mildew of maize (*Sclerospora maydis*) in the Northern Territory and Western Australia.

A collection of 530 isolates of plant pathogenic bacteria has been incorporated into the Herbarium as lyophilized cultures. The collection aims at maintaining representative isolates of all bacterial plant pathogens in Australia for diagnostic purposes and for epidemiological and taxonomic studies.

ENTOMOLOGY

Exotic Pests

The continued need for control of exotic insects recently introduced into Australia has highlighted this major problem to agriculture resulting from vastly increased international trade and tourism. The associated risk of pest introduction will remain high. Exotic insects requiring attention in 1979–80 were—

(1) *Lucerne aphids*—the three-year research programme established with special Treasury funding following discovery of spotted alfalfa aphid (*Therioaphis trifolii*) and blue green aphid (*Acyrthosiphon kondoi*) in New South Wales in early 1977 was concluded in June, 1980. Another important pest species—pea aphid (*Acyrthosiphon pisum*)—was discovered in Victoria in December, 1979. It was found in the Riverina district of New South Wales in January, 1980 and subsequently in low numbers at Bega, Nowra and Sydney. Its establishment is confirmed but its potential as a pest was not expressed in autumn 1980 because of drought. Continuing research programmes have now been modified to incorporate pea aphid studies. Surveys throughout the State in autumn 1980 showed that the spotted alfalfa aphid parasite, *Trioxys complanatus*, was well established in all lucerne growing areas. Good recoveries of the blue green aphid parasite, *Aphidius ervi* (11 per cent parasitisation) were recorded for the first time on a monitoring block near Sydney in May, 1980. Another instance of insecticide resistance in spotted alfalfa aphid was found at Armidale in March, 1980. The only previous record of resistance was at Tamworth in March, 1979. The resistance spectrum of the two strains was shown to be similar.

(2) *Warehouse beetle* (*Trogoderma variabile*) was found in 1977 in the Riverina at a number of sites associated with the rice industry, particularly in milling and storage areas. This insect is widely distributed in the Northern Hemisphere and is a persistent, economic pest of stored products in the U.S.A. It is closely related and similar in appearance to khapra beetle, a very serious grain pest not present in Australia. A three-year eradication programme was undertaken based on cleaning infested premises, spraying and fumigation. This was co-ordinated by the Consultative Committee on Warehouse Beetle (with Commonwealth and New South Wales Department of Agriculture representatives) and funded by State and Commonwealth government grants.

In 1979–80 intensive surveys located additional infestations at Griffith, Sydney, Leeton, Coleambally and Deniliquin. The control strategy was changed in November 1979 to containment in Griffith, where there were numerous infestations, while continuing eradication procedures in other areas. Progress will be reviewed later in 1980. The developments during 1979–80 emphasize the very great difficulties inherent in eradication of exotic insects.

(3) *European wasp* (*Vespula germanica*) was first found in New South Wales in early 1978. It is regarded as a pest overseas because of its severe sting, the large size of its nests and its capacity to attack bees in apiaries. An effective control method was developed using the insecticides dichlorvos and fenitrothion. Discoveries of nests have continued since 1978 in the Sydney Metropolitan area. All nests have been treated as located. The position will be reviewed in late 1980 to decide whether eradication is feasible and whether control action should be continued.

Locusts and Grasshoppers

A major plague of the Australian plague locust (*Chortoicetes terminifera*) throughout the Central Division of New South Wales in spring, 1979 provided opportunities to seek improved control measures by insecticide trials and ecological studies. Laboratory and field studies with new insecticides showed several promising materials. Phoxim was very effective at low rates and its large-scale use is being tested.

The extent and intensity of the plague rivalled the very large plagues of the 1930s and 1950s. The second swarming generation of locusts in summer 1979–80 was greatly reduced and only of minor concern. This was due to a very successful and well co-ordinated control campaign by the Department and the Plague Locust Commission and to the onset of drought conditions late in the first locust generation which restricted egg laying. Field monitoring also showed that parasites were very active in some districts.

A major research project was initiated to study the wingless grasshopper (*Phaulacridium vittatum*) a very serious pest of pastures and crops throughout the tablelands. This involved regular monitoring at 72 sites in all tableland regions. The biology of the insect, land use, parasites and diseases were examined in this the first year of a five-year programme. Plans were developed for a large-scale, pasture management trial, to examine effects of different grazing regimes on grasshopper numbers. This long-term study will be in co-operation with CSIRO, Armidale. Control experiments continued, with investigations of strategic, early-season use of insecticides as an alternative to broad-acre spraying. Methods for release of *Nosema locustae*, an imported disease of grasshoppers, were studied in conjunction with the Victorian Department of Agriculture.

Eucalypt Dieback

The possibility of very serious effects on agricultural production, forestry and tourism resulting from the death of eucalypts over extensive areas of the tablelands has caused general concern. Preliminary investigations by a New England Dieback Working Group have implicated leaf-eating chrysomelid and scarabaeid beetles as playing a major role. A study of all entomological aspects of the problem is being initiated at Armidale in collaboration with CSIRO and the University of New England, where various other aspects of the dieback problem are being investigated.

CHEMISTRY

ANALYTICAL CHEMISTRY

Spectroscopic Instrumentation

The inorganic analysis of plants, soils, waters and fertilizers has been enhanced by the introduction of new instrumentation. A Varian AA-775 Atomic Absorption Spectrophotometer has been coupled with a Gilson Sampler and a Technicon Dilutor. The dilutor can both dilute samples and add reagents to them, e.g. suppressants to overcome chemical interferences. The system can automatically analyse 120 samples which do not require dilution or 90 diluted samples per hour. It is calibrated by micro-processors and its improved gas flow control achieves stable flame conditions. These improvements enable the accurate determination of elements at lower levels than was previously possible, especially aluminium, which is very sensitive to flame instability.

PESTICIDE CHEMISTRY

Insecticide Residues in Potatoes

To avoid contamination of tubers, organochlorinated insecticides are no longer recommended for the control of African black beetle on potatoes. Several organophosphates (chlorpyrifos, isazophos, terbufos) and a carbamate (bendiocarb) are being evaluated as alternative protectants. Methods of analysing residues of these insecticides in potato tubers have been developed which are sensitive to residues well below the maximum residue limits established by the National Health and Medical Research Council. Analysis of tubers from experimental plots treated with recommended rates of the new insecticides have indicated that residues, if any, were below the level of detection.

Tetrapion Residues in Sheep

The herbicide tetrapion effectively controls the noxious weed of pastures, serrated tussock, but its effect on grazing animals was unknown. Methods were developed to analyse tetrapion residues in pastures and in muscle, fat, liver, kidney, blood, rumen, urine and faeces of sheep. Tetrapion was fed to sheep for 14 days at 0 to 200 mg/kg in a lucerne diet. Analyses showed that tetrapion was rapidly excreted by the animal and did not accumulate in edible tissues, enabling the herbicide to be registered for use in grazing situations.

Pesticides in MIA Reticulation System

The possible contamination of domestic water supplies by agricultural pesticides in the Murrumbidgee Irrigation Areas was studied throughout the 1979–80 irrigation season in response to public concern. Ten sites, two on the Murrumbidgee River and eight within the reticulation system, were monitored monthly for the major pesticides used on field and horticultural crops and for weed control in irrigation channels. Insecticide contamination was generally below limits of detection, although traces of DDT and dieldrin were found at some drain sites. The survey demonstrated that insecticide levels are either negligible or are within limits recommended by the National Health and Medical Research Council.

PLANT AND CEREAL CHEMISTRY

Survey of Essential Oil Plants

Essential oils are the oils extracted from foliage by steam distillation, e.g., eucalyptus oil. They have many industrial, medicinal, flavouring and perfumery applications. The Australian flora is rich in these oils which support a small but valuable industry. A survey of the Australian flora is continuing to seek more oils of commercial value. Of some 60 species examined in the past year, the following showed possible commercial promise: *Melaleuca linophylla* from Central Australia (oil yield 1.6 per cent; terpinen-4-o1 content about 52 per cent) and a strain of *Eucalyptus radiata* subspecies *radiata* from Mongarlowe (oil yield 5–6 per cent; terpinen-4-o1 8 per cent, cineole 55 per cent, phellandrene absent), both medicinal oils. The herb oil of *Kippistia suaedifolia* from near Ivanhoe is rich in perillyl acetate and may have perfumery applications. The foliage of "white" and "black cypress pine" (*Callitris columellaris* and *C. endlicheri* respectively), unwanted by-products of the timber logging industry, may also have perfumery uses.

Essential Oils and Stock Poisons in Stinkbush (Zieria)

The genus *Zieria* (family Rutaceae) is rich in both essential oils and components toxic to stock. About three hundred samples from the forty known taxa were tested for cyanogenic glycosides and distilled for essential oil. Results showed that cyanogenic glycosides were present in hazardous quantities in *Z. arborescens*, *aspalathoides*, *caducibracteata*, *cytisoides*, *fraseri*, *furfuracea*, *laevigata*, *montana*, *robusta* and *smithii*. The analysed oils assisted the taxonomic revision of the genus. The isolation and structural elucidation of methoxylated styrenes new to science is the first known occurrence of non-terpenoid styrene monomers in essential oils. Other potentially useful components abundant in the oils were benzaldehyde, citronellal, methyl eugenol, limonene (flavouring), carenone, chrysanthenone (perfumery), and chrysanthenyl acetate (medicinal).

Guar Quality

Guar is a tropical legume of potential value as a summer crop in northern New South Wales. Its seeds yield a group of carbohydrates, known as galactomannans, which are of great commercial value as thickening and gelling agents. Galactomannans produce highly viscous solutions and interact strongly with other commercially valuable polysaccharides such as Xanthan gum. Galactomannans consist of a long chain of mannose sugars with galactose sugars attached to certain of the mannose units at random points along the chain. It was found that enzymes could be used to selectively remove galactose units from the mannan backbone. Removal of 40 per cent of the galactose units increased the ability of guar galactomannan to combine with Xanthan guar some 100-fold. This development of enzymically modified guar galactomannan is of great potential value to industry and should provide strong impetus to the establishment of a guar industry in Australia.

New Biochemicals Patented

A new technique for the preparation of certain biochemical reagents used widely in clinical medicine, agriculture and the food industry, was invented, developed and patented. It is a very simple method of preparing soluble chromogenic substrates used to assay enzymes such as L-amylase and cellulase. It involves chemically modifying the substrate to increase its solubility and then dyeing it. The new reagents will be manufactured and marketed by a chemical company under licence to the Department of Agriculture.

Baking Quality of High Extraction Flours

Increasingly, flour millers are attempting to extract more flour from wheat grain during milling. As a result the flour becomes contaminated with bran and wheat germ. With this trend is the realization that heavier branned wheats have certain agronomic advantages, namely, resistance to frost and weather damage. As wheat breeders need to be constantly advised on changes in quality criteria, the effects of bran and wheat germ contamination on the baking quality of flour from prime hard wheat were examined using flour to which from 0 to 2.5 per cent of either finely-ground bran, wheat germ or both had been added. Results showed that wheat germ slightly improved loaf volume and appearance, whereas bran slightly degraded baking quality. When used together, baking quality was not altered significantly.

SOIL FERTILITY AND PLANT NUTRITION

Apple Nutrient Status

Four years of a five-year survey of the nutrient status of 75 apple orchards at Armidale, Orange and Batlow have been completed. Results of leaf analyses indicated that nitrogen and phosphorus levels generally were adequate; some high nitrogen values indicated excessive fertilization, with consequent adverse effects on quality. Many orchards have more than adequate phosphorus to meet the needs of the fruit tree and further applications of phosphorus could be discontinued except where it was required for a legume cover crop or sward. Potential savings were possible for the 20–30 per cent of orchardists who used expensive mixed fertilizers containing potassium, as leaf potassium was well above adequate levels. Zinc deficiency was widespread and low boron occurred in many orchards in certain seasons. A more effective means of correcting zinc deficiency in apples is needed and research to this end is in progress.

Nitrogen and Stubble Management in Rice-Wheat Rotations

Effects of stubble management, stubble quantity and nitrogen supply were studied in an irrigated rice-wheat rotation. Stubble incorporation at sowing greatly reduced nitrate availability and plant growth. Burning the stubble also resulted in poor growth of subsequent crops. Soil nitrate concentration was very low on these plots, due to volatilization of nitrogen following contact with stubble ash. Nitrate concentration and crop growth was greatest on plots in which the crop was sod-sown into standing stubble. The stubble mulch prevented weed growth and provided an insulation layer reducing fluctuations in soil temperature and moisture.

Soil Phosphate Testing

Research continues into ways of measuring the soil's capacity to supply phosphorus to plants. A study of 39 wheat-growing soils from northern New South Wales showed that the larger the negative effect of buffering on extraction of labile phosphate by a soil test, the higher is the correlation between the soil test and plant yield response to phosphate. The NH_4F extractant of Bray and Kurtz was the most sensitive to buffering in this respect while the modified $NaHCO_3$ test of Colwell was the least sensitive. Consequently critical levels for near maximum wheat yields increase with increasing buffer capacity for the $NaHCO_3$ tests but do not vary for the NH_4F test, which is now the preferred test in New South Wales.

Acid Soils

Acid soils are often characterized by toxic levels of aluminium and/or manganese and deficient levels of phosphorus. Amelioration with lime and superphosphate is necessary. Recent research on an aluminium toxic soil at Capertee has shown that established lucerne can tolerate high levels of sub-soil aluminium provided that lime is used in the top soil to ameliorate the effects of aluminium toxicity. Phosphorous additions have been without effect. Lime effects were still apparent six years after the original application.

SOIL MORPHOLOGY AND LAND USE ASSESSMENT

Irrigated Cotton Soils

Irrigated clay soils in the Namoi and Gwydir Valleys are being studied to define the soil factors responsible for the decline in cotton yields. Results of field experiments suggest inadequate aeration in the subsoil (below 20 cm in the profile) for up to 10 days after an irrigation. Yield of cotton decreased progressively with increasing duration of irrigation between 4 and 16 ha. An 8 per cent

yield loss occurred between the 16 ha and the 4 ha treatments. The aeration problem might be due to soil structural damage by cultivation at unsuitable moisture content. Further experiments are designed to define the optimal moisture content for land preparation and cultivation in these clay soils.

Land Use Assessment—Narrandera District

The favoured location for intensive irrigated horticulture at Narrandera is sandhill country, which consists of two distinct types. The most important is the sand dunes of the level clay plains, consisting of deep accumulations of wind-blown sand, often surrounded by an irregular fringe of sandy soil with clay at shallow depths. The crests and upper slopes of these dunes are the most promising positions for citrus orchards. Tree plantings may be successful on the occasional small dunes formed on the second type of sandhill country, the sand-covered rocky hills. On these only a veneer of sand usually covers the hill, with rock often outcropping on the crest. The slopes of such country and the "sand fringe" surrounding the large dunes of the clay plains may be suitable for irrigated vegetable crops.

AGRICULTURAL ENGINEERING

A unique mobile dynamometer that can measure both vertical and horizontal loads imposed by implements on tractors, as well as the P.T.O. power transmitted, the ground speed and tractor wheelslip, was designed and built at the Agricultural Engineering Centre, Glenfield.

An electrically driven combing machine to remove cashmere from goats is being developed and tested. Applications for patent in Australia and in a number of other countries have been lodged.

A major new activity on energy for agriculture involves the study of on-farm ethanol production. $455,000 has been allocated by the N.S.W. Government, over four years, for development of a field plant at the Agricultural Engineering Centre, Glenfield. A Research Officer (Fermentation Technology) has been appointed and will work with other staff at the Centre.

To date, equipment manufactured for the project includes two distillation columns, two grain bins, and supporting framework for pumps, mills, columns, etc. Design of many other components of the distillation plant has been completed and laboratory-scale fermentation experiments have begun. A contract has been let for the installation of storage tanks and service facilities for the project at Glenfield.

Initially, grains will be used as the raw material for fermentation but in later stages of the project, the processing of sugar crops will be evaluated. After the basic plant is operational, further development phases will include evaluating technology for handling and burning straw to raise steam in a boiler; "drying" of alcohol on farm to allow blending with petrol; drying of left-over distillers grains for stockfeed, and on-farm extraction of sugar from cane, sweet sorghum and beets.

Other energy related work included the successful testing of a diesel tractor running on rapeseed oil and the fitting of wheelslip and fuel flow meters, used with a drawbar dynamometer, to measure the efficiency of fuel use in direct drilling experiments.

EXTENSION RESEARCH

Readers' Reactions to Farmer Bulletins

An investigation of the use and acceptance of general information bulletins by recipients showed that they were read thoroughly, were easy to understand and are kept for future reference.

Review of Extension

Resource allocation for extension, extension staff experience, productivity and communication were assessed for the period June, 1978, to June, 1979.

Potential Computer-based information services for extension

The aims of this study were to identify the kinds of reference information that extension officers require for their advisory work and to identify existing bodies of codified information which could be stored on computer. The need to store pesticide subject matter is particularly pressing.

Sheep Lice Survey

Information on the methods to control sheep lice used by farmers and graziers throughout New South Wales and on their attitudes towards government measures to control sheep lice was collected in conjunction with district veterinary officers. No conclusions have yet been made as data are still being analysed.

MARKETING AND ECONOMICS

Production Economics Research

The Division of Marketing and Economics continued to investigate the efficient use of resources by farmers in the production, harvesting, and storage of commodities. Major production economics projects were undertaken on the economics of alternative pasture improvement strategies in a number of the Regions. Research was also undertaken on the economics of pasture weed control, investment in farm forestry and minimum tillage systems. In the dairy industry, a study was conducted of the determinants of dairy cow yields in the State. Energy projects included a detailed survey of farm energy useage in each region of the State and a study on alternative energy policies for the agricultural sector. Other survey work included studies on farm income instability in one region of the State.

Farm Business Management

The Division expanded its research and extension efforts with computer-based farm management aids. Research in this field produced a number of working models including a drought feeding model. Extension activities in the computer field were in high demand and officers conducted workshops and addressed various audiences on the role of computers in agriculture. The COMPLAN computerized farm planning service continued to expand and a new handbook of enterprise budgets was produced for the New England Region.

Farm business management continued to be a substantial component of regional economists' research and extension activities. Bulletins were prepared on syndication, sharefarming agreements, death duties and estate planning, carpet wool production, beef cattle production as well as numerous gross margin budgets in all regions.

Marketing Research

Investigation of a number of commodity markets was undertaken, including the protein feeds industry, apples and pears, pigs and beef.

The market implications of product description schemes such as carcass classification in the pig, sheep and beef industries were also studied. Forecasting activities were continued, particularly in the area of beef forecasting. Commodity market trends both domestic and overseas were monitored and reported in publications and radio tapes.

The Division also investigated and reported on marketing policy issues and marketing arrangements. The Farm Produce Agents Act and the Marketing of Primary Products Act were among the legislative issues researched. Studies were also undertaken on wheat marketing and pricing, and quota systems for the egg and tobacco industries. Inquiry submissions were prepared for the PJT on livestock selling commissions, and for the IAC on fruit and fruit products and the apple and pear industry.

Submissions to Inquiries and Government Businesses

The Division devoted substantial staff resources to the Grain Handling Inquiry. In addition to the secondment of two officers, four projects were specifically done for the Inquiry. Related research was conducted on the economics of grain insect control and the problems of sampling for grain insects in grain handling systems. Analysis of legislative issues included studies on the economic consequences of plant variety rights legislation. Analysis of current Government activities included studies for the Cattle Tick Review Committee and a benefit-cost study of the 1979–80 plague locust control programme.

BIOMETRY

The analysis of data from surveys and experiments in which observations are put into categories, such as the number of fruit in a particular size-range or the proportion of stock with defined characteristics, has been extensively investigated in recent literature. A linear logistic model fitted by maximum likelihood and a log linear model fitted by weighted least squares have been recommended. These methods were investigated and shown to be related.

Row-column designs are frequently used for long-term horticultural trials as they take into account variation in two directions. However, such designs present difficulties when treatments are changed. During investigations of the combinatorial properties of such designs, the complete set of 4 x 4 frequency squares was enumerated.

Many agricultural experiments produce long sequences of observations such as monthly weights of animals, annual girths of fruit trees and moisture content of sections of soil cores. These observations are correlated and methods of analysing such data that make use of their covariance structure were clarified.

EXTENSION

EXTENSION ADMINISTRATION

The clients of this Department include farmers, research workers, commercial firms, financial institutions, schools, colleges, universities, rural youth groups, adult rural groups, other government departments and consumers. To service this wide range of clients, divisions have located most of their officers in the country.

The Division of Extension Services provides the framework under which District Officers carry out their roles in extension. Regional Directors of Extension administer the Department's Extension Services located in 8 decentralized regions. Support staff provided by the Division of Extension Services at regional headquarters and some district offices includes extension officers, regional publicity officers, regional clerks and field assistants. Office staff and accommodation are administered by the Division, which also provides specialized staff and services at Head Office.

Other Divisions have specialist officers at regional headquarters and Head Office to support district officers. Veterinary staff also have an extension role but are outside the regional extension service.

Support for Extension

During the year many primary producers contributed land, facilities, machinery, livestock and labour towards demonstrations and other extension activities of this Department. Manufacturers contributed fertilizers, chemicals, machinery and fencing material for similar purposes. Radio, television and print media gave generously of time and space to foster various extension activities.

Highlights

- Each extension region was provided with a colour video tape recorder/player and monitor. This equipment enables staff and clients to view the increasing range of video material available and to receive training in the preparation of video material.
- Micro computers were located at two regional centres to assist with staff training in the use of computers in agriculture.
- Dr Evans, Professor of Communications and Journalism at the University of Illinois, spent three months on sabbatical leave working with the Division of Extension Services. Funded by the Commonwealth Extension Services Grant, he prepared reports on farmer bulletins in New South Wales and computerized information systems for extension staff.

Plague Locust Control

New South Wales suffered the most serious and extensive outbreak of plague locusts for 25 years during the spring and summer of 1979. The worst affected areas were the North West, Western and Riverina areas of the State.

The programme was under the control of the Division of Animal Production, in particular, Principal Officer (Drought). Regional Directors of Extension co-ordinated control programmes which utilized country based extension staff, Pastures Protection Board staff and landholders in a co-operative campaign. Aircraft from the Armed Services, Government Departments and on charter accelerated the rate of control spraying of hopper bands.

The number of holdings on which hatchings occurred totalled 8 619 and these were distributed in the North West (1 688), Western (4 061) and the Riverina (2 870).

Publicity from each of the regions involved amounted to 190 radio tapes, 40 press articles, 15 television programmes and one "Agricultural Gazette" article.

By mid-summer the situation was under control and the resultant damage to crops and pastures was much less than had been anticipated.

Extension Training

Staff from the division conducted schools and workshops dealing with various aspects of communication, group activities, decision making and planning for District Officers, Rabbit Inspectors and Rangers, Pasture Protection Boards and Plant Diseases Act Inspectors.

Commonwealth Extension Services Grant 1979–80

The Chief, Division of Extension Services, is responsible for the administration of funds for extension and regional research made available by the Commonwealth Government through the Department of Primary Industry.

The total allocation to New South Wales from the Commonwealth Extension Services Grant for 1979–80 was $1,201,000. This was less than half of the allocation made in 1978–9.

The following table records the allocations for salaries, operating and capital items from 1977–78 to 1979–80.

Allocation of funds for extension and regional research.

Year	Salaries	Operating	Capital	Total
	$	$	$	$
1977–8	1,625,183	655,202	163,381	2,443,766
1978–9	1,446,984	95,900	95,990	2,443,776
1979–80	660,195	505,805	35,000	1,201,000

Extension Staff	North Coast	New England	Western	Central West	Southern	South West	South East and Illawarra	Mid Coast and Hunter	Total
Regional Director of Extension	1	1	1	1	1	1	1	1	8
Assistant Regional Director of Extension	1	1	1	1	1	..	1	1	7
Field Assistant	5	5	3	4	3	6	5	3	34
Extension Officer	3	3	2	3	1	2	3	3	20
Research/Extension Liaison Officer	..	1	..	..	..	..	..	..	1
Regional Publicity Officer	1	1	1	1	1	1	1	1	8
Migrant Liaison Officer	..	..	..	..	..	1	..	..	1
Clerical Officer	3	3	2	3	3	3	2	2	21
Stenographer and Typist (including casual)	16	9	9	10	8	12	12	11	87
Special/Assistant Principal Agronomist	..	2	2	1	1	1	..	..	7
District Agronomist	5	8	7	6	4	9	7	4	50
Agronomist	..	1	..	1	1	1	..	..	4
Field Officer (Weeds)	..	1	1	1	..	1	..	..	4
Seed Production Officer	..	1	1	1	3	..	..	..	6
Tobacco Officer	..	1	..	..	..	..	..	..	1
Special Livestock Officer (Sheep and Wool)	..	1	..	1	..	..	1	..	3
Livestock Officer (Sheep and Wool)	..	4	6	4	4	4	3	..	25
Livestock Officer (Beef Cattle)	3	4	2	2	3	1	3	2	20
Livestock Officer (Pigs)	1	2	1	2	1	1	1	2	11
Livestock Officer (Poultry)	..	1	..	..	..	..	..	3	4
Livestock Officer (Apiculture)	..	1	1	..	..	..	1	..	3
Livestock Officer (Sheep Fertility Service)	..	..	..	..	1	..	..	..	1
Principal Horticulturist	1	..	..	..	..	..	..	..	1
Special Horticulturist	..	..	..	..	..	1	..	..	1
District Horticulturist	6	1	1	2	1	7	2	6	26
Supervising Inspector (P.D. Act)	1	..	..	1	..	1	..	..	3
Inspector (P.D. Act)	7	3	1	3	3	15	2	7	41
District Livestock Officer (Dairying)	5	..	..	..	..	..	2	3	10
Livestock Officer (Dairying)	6	..	..	..	..	1	2	5	14
Herd Organizer	..	..	..	..	..	..	1	1	2
Herd Recorder	7	..	..	..	1	5	15	11	39
Agricultural Mechanization Officer	1	2	1	1	1	1	1	..	8
Economist	1	3	2	2	2	2	1	1	14
Locust Patrol Officer	..	..	1	..	..	..	..	..	1
Market Officer	1	2	2	..	1	..	..	..	6
Technical Advisor (Vertebrate Pests)	..	..	1	..	..	..	..	..	1
Pesticides Inspector	1	1	1	1	..	1	1	1	7
Pastures Protection Officer	..	1	1	..	1	..	1	..	4
Research/District Agronomist	..	..	..	..	..	..	..	1	1
Others	..	..	..	..	..	..	..	1	1
Total	76	64	51	52	46	78	69	70	506

EXTENSION PROGRAMMES

NATIONAL AND STATE PROGRAMMES

Drought strategies

Drought conditions were experienced over most of the State during the summer of 1979–80. An extension campaign was mounted to assist livestock producers minimize the economic impact of the drought.

Meetings, field days and schools conducted throughout the State were supported by newspaper articles, radio broadcasts and information bulletins.

In the Western Region during a 3-month period over 1 000 producers attended a series of drought strategy meetings.

In the New England Region 30 drought meetings attracted 18 000 producers whilst 70 radio broadcasts, 50 press releases and two television programmes supported the campaign. The locally produced bulletin titled "Management Options During a Drought" reached 3 000 producers. Similar campaigns were conducted in the other regions.

During the autumn, Departmental officers acted as agents for the Australian Wheat Board in handling sales of feed wheat. During the first month of operation wheat sales reached 14 000 t.

Pesticides Act 1978

A major State-wide extension programme to encourage the safe use of pesticides was launched at the Department's stand at the Royal Easter Show. This programme will be continued in each region in 1980–81 through a regional co-ordinator. The campaign will be introduced just prior to and during the major period of use of pesticides in each region.

Brucellosis Eradication Campaign

With the whole area of the State involved, the level of extension activities increased during the year. The appointment of a publicity officer allowed the production of a wide range of material. A booklet giving background to the campaign provided information for producers, agents and the community at large. Ten fact sheets distributed to producers gave specific information.

Special leaflets were prepared dealing with tail tagging, stock movement and progress of the campaign. A monthly newsletter provided information to campaign staff.

During the year 43 500 property visits were made involving the testing of 26 631 herds.

Objective measurement in stud and flock sheep breeding

The number of measured rams increased from 29 000 (110 studs) in 1978–9 to 35 000 (130 studs) in 1979–80. Approximately 40 per cent of all merino rams sold last year in New South Wales were measured.

30 studs were involved with ram grading schemes, identifying the heavy cutters within their normal visual grades.

Beef cattle breeding and improvement

An experienced beef cattle livestock officer was located with the Animal Genetics Breeding Unit at the University of New England. Part of his duties are associated with the National Beef Recording Scheme. This scheme now attracts over 10 000 herds for pedigree and performance recording.

Brood Diseases of Bees

European and American brood diseases continued to cause concern in commercial apiaries. To improve the situation a campaign was mounted involving temporary apiary inspectors, and an integrated programme of Regional publicity, field days and special publications.

Mastitis Advisory Scheme

The mastitis advisory service continued to provide monthly bulk milk somatic cell counts (B.M.C.C.) to all farmers.

This service has been associated with a significant decline in the number of state average B.M.C.C. from 822 000 cells/mL in 1973 to 462 000 in 1980.

It is estimated that the reduction in mastitis levels gave a milk production increase valued at $8 million in 1979–80. The Department's target figure is 300 000 cells/mL.

In conjunction with Beecham Veterinary Products the Department conducted a statewide B.M.C.C. competition which assisted with the reduction in cell counts. Intensive work in one area resulted in the ranking of the local factory rising from 31st to 17th in only six months.

Super Pork Promotion

Livestock Officers (Pigs) promoted super porker production and new carcass cutting methods at field days and group functions. These pork cuts opened up new markets for pig producers.

New South Wales Dairy Farm Performance Scheme

The Divisions of Animal Production and Plant Industry and the Biometrical Branch developed a computer based scheme for comparatively analysing dairy farm management data.

Developed from several smaller schemes the operation involved 115 dairy men at Lismore, Coffs Harbour, Grafton, Taree, Nowra and Bega in a monthly and annual analysis of a wide range of input and output data.

The analysis gave information about input/output relationships, enabling producers to make improved farm management decisions.

Departmental officers used the computer print-outs as extension aids in discussing farm management strategies with producers in small discussion groups and in face to face situations. Group discussions enabled dairymen to compare results achieved with others and make appropriate management decisions.

Grain Pest Control

District Agronomists continued to conduct a campaign to reduce grain pests in the main cereal growing areas. Information about grain pests was included in field days and meeting programmes.

Direct Seeding of Wheat

Established techniques of direct seeding of wheat were demonstrated in the southern areas of the State. A survey of the potential for direct seeding was conducted in the north.

Last year 180 farmers undertook direct seeding on 12 000 ha of crop, mainly in the Cootamundra/Yerong Creek area. Directly sown crop yields were similar to those produced from conventionally established crops.

Pasture Legume Aphid

District Agronomists in co-operation with entomologists completed a 3-year survey of the incidence of lucerne aphids and resulting damage.

New lucerne varieties were demonstrated throughout the state. Mass media and group methods were used to disseminate information results and inform producers of the acceptable varieties.

REGIONAL AND DISTRICT PROGRAMMES

More attention was given to programmes dealing with community development and youth, reflecting the upsurge in Rural Youth activities.

Farm business management programmes covered a range of items including dairy farm performance reporting, efficient use of fertilizers, cross breeding of beef cattle and fruit packing.

Winter Milk Production

Further increases in milk production quotas in non BMQ areas of the State have highlighted the need for dairymen to increase winter production.

In the Macleay area the introduction of silage, using crop and pasture material, has been of considerable assistance. Where irrigation is available high seeding rates of rye grass, accompanied by heavy rates of nitrogen fertilizer have spectacularly improved the winter feed supply. Winter production has been also stimulated by production incentive schemes introduced by local factories.

Horticultural Irrigation Efficiency

Horticulturists in Sunraysia and the Murrumbidgee Irrigation Areas continued an extension campaign designed to improve irrigation efficiency. The campaign will lead to a reduction in water use, improvement in the drainage situation and a reduction in irrigation costs. A number of significant developments took place in 1979–80.

A series of television and radio cartoon-style programmes outlined the principles and practice of modern irrigation. The Rural Youth Irrigation School held at Yanco catered for young horticulturists. An in-service school for District Horticulturists maintained their technical knowledge levels.

EXTENSION PROGRAMMES

Subject of programme	Number of programmes
Production	502
Farm Business Management	75
Marketing	34
Regulatory	24
Environment and Consumer Protection	18
Community Development	32
Programmes for Youth	64
Other	107

Regional Extension Services

Total number of farms visited at least once—16 575.

Group extension (excluding Rural Youth)	Total number	Attendance
Field days	1 262	52 883
Meetings	1 902	50 060
Schools, courses	290	12 057

Mass media output	Number
Articles for the Agricultural Gazette	56
Articles for Dairy Topics	33
Articles for State-wide journals and magazines	113
Original press article	3 319
Original radio broadcast	3 227
Original TV programmes	247
Issues of original and district newsletters	361
Joint papers and articles with research workers	30
Number of titles of regional or local bulletins and pamphlets	339
Contributions to research/extension liaison conferences	129

Veterinary services	Number
Property visits	12 315
Press releases	654
Contributions to newsletters	73
Radio broadcast	137
Television programmes	10
Addresses to meetings	522
Field day sessions	83

RURAL YOUTH ORGANIZATION

During the year, membership increased by 23 per cent in the junior section with the formation of 36 new clubs. Approximately 75 per cent of junior members live on farms or in rural communities.

The Animal Nursery consisting of over 300 farm animals was organized by the senior section at the Roselands shopping centre in Sydney and was viewed by 70 000 people. Demonstrations of shearing, milking and feeding lambs were put on by the members each day.

Rural Youth

	Total number
Rural Youth Clubs	174
Junior Members	3 616
Senior Members	541
Meetings, field days, etc.	1 513
Audience attending—educational activities	21 842
social functions	8 050
organizational functions	7 840
Farm or home visits by rural youth officers	1 724

Farm Management Course

Enrolment for 1980 increased by 17 per cent over the 1979 figures with—126 for Level 1; 34 for Level 2; and 18 for Level 3. Extension Officers conducted monthly tutorials for the students in their district to assist them with the course. Residential schools were held at the University of New England and at Sydney University farm at Camden.

Farm Office Management Course

Enrolments doubled in 1980 following a promotion campaign with 381 students undertaking the course. In each region of the State two weekend residential schools were conducted, one at the start of the Course and one in the spring.

Course material for both courses was distributed monthly from Head Office.

AGRICULTURAL BUREAU OF NEW SOUTH WALES

During the year 351 branch functions attracted an audience of 12 866. In addition, over 3 000 people attended the Murrumbateman Branch's "Small Farmer Machinery Field Day."

The Rural Bank/Agricultural Bureau-sponsored Beef Cattle Breeders Competition attracted a record 113 entries from around the State. 4 162 cattle were judged during the Competition and 1 200 people attended the zone and district field days.

Agricultural Bureau

	Number
Agricultural Bureau Branches	71
Members	2 322

RURAL ADJUSTMENT

Bank Managers

Seminars and field inspections were conducted for bank managers in a number of areas. On the north coast a series of bankers' meetings were held whilst inspections were made of tropical fruit plantations and the local tea-growing enterprise. These functions enabled extension staff to explain to bankers the unique characteristics of agricultural development.

Changing Land Use

High prices for most agricultural commodities slowed down the movement out of agriculture. The associated high land values enabled those leaving farms to do so with reasonably high levels of assets and with dignity.

Continuing subdivision in coastal areas and near the large towns has seen an influx of new landholders. Many of these people have limited agricultural knowledge. To meet their requirements, weekend field days have been organized. A small farmers' field day held at Mudgee attracted an audience of 2 000.

EXTENSION PUBLICATIONS

The Division of Extension Services Head Office Section processed 243 publications for printing by the Government Printing Office, Ultimo. An increasing number of items were handled by the printery in the McKell Building.

Publications included the two-monthly *Agricultural Gazette of New South Wales*, the quarterly *Poultry Notes* and *Dairy Topics*, a substantial number of specific subject matter items, single page information sheets and news releases.

An I.B.M. composer was delivered in May 1980. This equipment allows for rapid production of attractive camera-ready copy for small jobs. Low cost bulletins designed to match the main farmer bulletin series, can be produced very efficiently.

The production of the revised and re-designed edition of the *Home Vegetable Garden* sale publication met an increasing demand.

During the year, 341 465 publications were distributed, 306 190 of them through country offices.

After a gap of a year, publication of the quarterly *Extension Forum* was resumed and liaison with field officers improved following the appointment of a Communications Liaison Officer.

During April the newly established staff newsletter *Aglink* became the responsibility of the newly appointed Public Relations Officer. The new appointee promotes and projects information about Departmental programmes and initiatives to the metropolitan audience. Reponsibility also involves editing and issue of Departmentally initiated Ministerial news releases.

The two research series of Science and Technical Bulletins again proved to be popular publications.

Two Agbulletins were published. These publications keep extension workers up to date with new developments in research and extension.

AGRICULTURAL ECONOMICS PUBLICATIONS

The *Monthly Commodity Bulletin*, containing commodity outlook and general extension material with State-wide application, continued to be published and distributed to 600 policy makers, extension workers and producers.

Fifteen Regional bulletins were published on an irregular basis.

A new series entitled *Farm Management Bulletin* was commenced with one issue being published.

1 420 copies of each edition of *Weekly Marketing Notes* were distributed.

GARDEN ADVISORY SECTION

The Home Garden Inquiry Service was transferred to the Division of Horticulture on 1st July, 1979, and renamed Gardens Advisory Service. The three officers presented 15 lectures to garden clubs, horticultural societies and agricultural bureaux and visited gardens and nurseries in the Sydney Metropolitan Area. They also revised some existing publications and prepared material for New Departmental bulletins.

Service to the public was improved by increasing the numbers of telephone lines from three to six.

Garden Advisory Service

Total inquiries for the past years were—

1977–8	19 348
1978–9	17 989

Inquiries for the year 1979–80 were:

Telephone	25 909
Postal	751
In person	2 539
Field officers	148
	29 347

LIBRARY SERVICES

The technical library service comprises collections under the care of librarians at the Head Office library, the Biological and Chemical Research Institute, the Glenfield Veterinary Research Station, the three agricultural colleges and the five research centres at which regional directors of research are located.

Other material is stored at regional extension headquarters, district offices, and research stations throughout the State.

The library exists to inform officers of new developments in their field of expertise, to obtain information that they specify and to assist in staff development.

Current Awareness

Some 1 000 periodical titles are received by subscription, donation or exchange and these are circulated to individuals and research stations.

A Library Bulletin is published in 4 series at differing frequencies for each series. These notify items newly received, ranging from books to pamphlets, annual reports and new periodicals.

Reference and Research

Literature searches are carried out upon request but generally research workers prefer to do their own. Reference queries number in the thousands, some of which result in many loans being sought and photocopies obtained.

Regional librarians have been appointed on a full-time basis to act as resource persons rather than custodians. Their prime duty is to see that each professional officer gets the best match between his needs and the resources available.

Availability of computer terminals, membership of the CLANN network, and availability of microfiche is rapidly increasing the supply of information at the workface.

A machine readable bibliography of Departmental publications is now in its testing phase and will be on line in 1980–81.

Libraries at the agricultural colleges have their own funds but access to the wider technical library service greatly increases their usefulness.

Staff development is encouraged by the library holding material of general interest and by obtaining references required by staff in their educational programme.

REGULATION AND TECHNICAL SERVICES

REGULATORY FUNCTION OF THE DEPARTMENT

The enforcement and implementation of statutory provisions is the function of Government. As such, the New South Wales Department of Agriculture has a basic function in—

- The control or eradication of plant and animal diseases.
- Ensuring quality standards in respect of agricultural products, especially foodstuffs and aids such as stock medicines, pesticides, etc.
- Maintaining standards of conduct in areas of activity associated with agriculture.

These powers and responsibilities are vested in the Department through various Acts and their Regulations.

Some officers perform regulatory activities together with other responsibilities: In addition, particular groups are appointed for specific regulatory functions: for example, meat inspection, cattle tick control, brucellosis eradication, plant disease regulations, quarantine inspections for imported produce and quality inspections for exports.

Regulatory work is a major activity in three Divisions of the Department, as indicated in the following section.

The Legal Section, in consultation with relevant Divisions, prepares legislation (including amendments to existing statutes), prepares information for prosecutions and appears on behalf of the Department in defended cases.

REGULATORY STAFF

The following table summarizes Departmental staff who are inspectors under an Act who are directly involved in regulatory work. Many of the professional staff have a dual regulatory/extension function.

Departmental regulatory staff as at 30th June, 1980.

	Central Administration	Animal Industries	Horticulture	Plant Industry	Biological and Chemical Research Institute	Total
Professional	6	96	4	0	1	107
Inspectors	8	1 287	135	3	0	1 433
Total	14	1 383	139	3	1	1 540

SUMMARY OF REGULATORY ACTIVITIES

Activities are listed under the following main Acts:

- State Acts: Agricultural Holdings Act, 1941; Agricultural Seeds Act, 1921; Apiaries Act, 1916; Canned Fruit Marketing Act, 1979; Cattle Compensation Act, 1951; Dairy Industry Act, 1915; Dairy Industry Marketing Authority Act, 1979; Farm Produce Agents Act, 1926; Fertilizers Act, 1934; Horticultural Stock and Nurseries Act, 1969; Marketing of Primary Products Act, 1927; Meat Industry Acts, 1915 and 1978; Noxious Insects Act, 1934; Pastures Protection Act, 1934; Pest Destroyers Act, 1945; Pesticides Act, 1978; Plant Diseases Act, 1924; Potato Growers Licensing Act, 1940; Poultry Processing Act, 1969; Pure Food Act, 1908; Registration of Stock Brands Act, 1921; Stock (Artificial Insemination) Act, 1948; Stock (Chemical Residues) Act, 1975; Stock Diseases Act, 1923; Stock Foods and Medicines Act, 1940; Swine Branding Act, 1940; Swine Compensation Act, 1928; Veterinary Surgeons Act, 1923; Wine Grape Processing Industry Act, 1979.

● Commonwealth Acts: Quarantine Act 1908–73; Commerce (Trade Descriptions) Act 1905.

The following general activities were undertaken under the abovementioned State Acts: informations 202; proclamations 41; notifications 46; and gazettal of appointments, etc., 63.

Agricultural Holdings Act, 1941

Two matters were referred to agricultural committees.

Agricultural Seeds Act, 1921

A total of 88 stores and 850 t of seed was inspected. Of 71 samples taken, twenty-six were below standard and twenty-four warnings were issued. There were two prosecutions.

Apiaries Act, 1916

Restrictions on the movement of bees and apicultural products into New South Wales were eased. Registered apiaries totalled 3 672.

Canned Fruits Marketing Act, 1979

This new New South Wales Act is part of complementary Commonwealth/State legislation designed to enable the Australian Canned Fruits Corporation to acquire and sell all the Australian production of canned deciduous fruits.

Cattle Compensation Act, 1951

Compensation was paid for 14 789 cattle ordered to be destroyed on account of suspected disease and for 34 carcasses condemned during meat inspection.

Diseases on which claims were paid follow:

Disease	Claims	Cattle and carcasses
Brucellosis	4 060	14 549
Johne's disease	8	11
Tuberculosis	50	263
Tick fever	..	..
Total	4 118	14 823

Dairy Industry Act, 1915

Dairy factories registered	72
Dairy produce stores registered	155
Dairy factory and store inspection	192
Remedial orders issued	16
Certificates of competency issued—	
Milk grading	42
Cream grading	0
Milk testing	19
Cream testing	16
Cheesemaking	3
Buttermaking	0

Dairy Industry Marketing Authority Act, 1979

This Act was assented to on 24th December, 1979. When proclaimed it will integrate the provisions of the Dairy Industry Act, 1915, and the Dairy Industry Authority Act, 1979, which latter Acts will be repealed.

Farm Produce Agents Act, 1926

Licences were issued for 223 Farm Produce Agents.

Fertilizers Act, 1934

580 fertilizers were registered, three applications were refused and ten warnings were issued.

Horticultural Stock and Nurseries Act, 1969

There were 564 new registrations of nurserymen and 724 of resellers.

Marketing of Primary Products Act, 1927

This Act provides the opportunity for producers in this State to set up a Marketing Board to compulsorily control the marketing of the product concerned. There are twelve boards operating under the Act.

Meat Industry Acts, 1915 *and* 1978

The State Meat Inspection Service carried out ante-mortem and/or post-mortem inspections of livestock at 29 export establishments and 43 non-export abattoirs and slaughterhouses throughout the State.

Inspection of carcasses and viscera (no.)*

Adult cattle	2 171 942
Calves	243 101
Sheep, lambs and goats	9 284 751
Pigs	1 117 818

* Including inspections under the Commerce (Trade Descriptions) Act for export purposes.

Re-inspection of meat from other States and New Zealand.

	Carcasses	Piecemeats
		kg
Beef	98 592	12 639 858
Calves/veal	118 586	322 858
Sheep and goats	554 652	972 221
Pigs and pork	44 116	3 633 353
Buffalo	..	6 695
Processed meats	..	10 392 228

Noxious Insects Act, 1934

This Department, the Australian Plague Locust Commission, Pastures Protection Boards and landholders co-operated in a major campaign to control the Australian plague locust during 1979. Because of heavy expenditure it was necessary to increase the Noxious Insect Levy prescribed under the Act from 0.5 c to 1 c per head for sheep and from 3 c to 10 c per head for cattle.

Pastures Protection Act, 1934

The continued control of declared noxious animals was effected through pastures protection boards. Sodium monofluoroacetate (1080) is available only under the strict supervision of boards' staffs to control vertebrate pests declared noxious under the Act, namely the rabbit, feral pig and dingo. Aerial baiting requires the approval of the Minister.

Prosecutions are the responsibility of pastures protection boards.

Pest Destroyers Act, 1945

Applications were received for 456 new products, 410 amendments to existing labels and 1 314 annual re-registrations.

Pesticides Act, 1978

Certain provisions of this new Act became operative.

Plant Diseases Act, 1924

Inspections in districts—

	No.
Orchard, plantations, vineyards	9 913
For planting statistics only	1 038
Fruit shops and stalls	5 035
Home gardens	22 837
Grain storages and processing premises	1 481
Notices issued for pest and disease control	486
Nurseries	2 501
Resellers	2 678

Inspections at markets—

Detention notices issued for non-compliance with grading, packing and labelling regulations—

	No. of packages
Apples	18 323 + 20 bins
Pears	15 754 + 44 bins
Citrus	19 127 + 60 bins
Grapes	5 984
Bananas	1 175
Tomatoes	8 297
Rockmelons	10 875 + 7 bins
Potatoes	31 008 + 16 bins
Vegetables	3 980
Mangoes	712
Plums	6
Peaches	804
Avocados	384
Olives	18
Castaway Certificates	3 200 approx.
Total	117 447 + 147 bins

Prosecutions—two (one successful, one unsuccessful).

Potato Growers Licensing Act, 1940

There were 548 registrations of potato growers and 670 inspections of properties.

Poultry Processing Act, 1969

The 110 registered poultry processing plants were inspected, involving 852 visits.

There were nine prosecutions for excessive water uptake.

Pure Food Act, 1908

The Department, in conjunction with the Health Commission of New South Wales, inspected all New South Wales milk-drying and dried milk packaging plants and continued a monitoring programme to ensure *Salmonella*-free dried milks.

Registration of Stock Brands Act, 1921

	Number
Brands for large stock	2 160
Sheep brands and earmarks	1 925

Stock (Artificial Insemination) Act, 1948

One artificial breeding centre was registered in New South Wales for the production of licensed bovine semen. Certificates of Competency to inseminate cows were issued to thirteen persons.

Stock (Chemical Residues) Act, 1975

Samples of fat collected from cattle slaughtered at nineteen export abattoirs were analysed for the presence of chemical residues. Cattle found to exceed the maximum residue limit (MRL) were detained on six properties. Thirteen properties were under detection orders on 30th June, 1980, six being for dieldrin, six for DDT and one for heptachlor. Another 17 were under investigation.

Analysis of 10 570 samples showed that 67 per cent were free of all residues and 0.4 per cent was above the actionable level.

Pesticide residues in samples from New South Wales cattle, 1979–80.

Residue	MRL (p.p.m.)	Number of samples			
		Above MRL	50–100 per cent MRL	Below 50 per cent MRL	Total
DDT	5	15	31	3 077	3 123
Dieldrin	0.2	28	44	72	144
HCB	0.5	..	..	3	3
Other	..	..	..	9	9
No residue					7 092

DISEASE AND PEST CONTROL—REGULATORY

Brucellosis Eradication Campaign

Eradication testing has now been expanded into all Pastures Protection Districts in the State and the first areas in New South Wales reached Provisionally Free Status in July, 1979. This important milestone was achieved well ahead of schedule and illustrates the success of the Campaign so far. The Provisionally Free Area consists of the Pastures Protection Districts of Armidale, Casino, Denman-Singleton, Glen Innes, Gloucester, Grafton, Inverell, Maitland, Merriwa, Port Macquarie, Tamworth, Tenterfield, Tweed-Lismore, Upper Hunter and Warialda.

During the year, all Pastures Protection Board Districts under the supervision of the District Veterinary Officers, Wagga and Narrandera, and part of the Moree district, with Pilliga and Narrabri under the control of the District Veterinary Officer, Gunnedah, were added to the Control Area, which previously included the whole of the districts of the District Veterinary Officers, Goulburn and Cumberland.

During the year, 10 406 properties were tested for the first time and retesting visits brought the number of field contacts to well in excess of another 43 588.

The tail tag identification system for cattle being sold for slaughter received a major review with the addition of a check digit and a State prefix as part of the identifying number. This has afforded greater accuracy to the system, and extensive publicity was given to its introduction. At the same time, a major extension campaign dealing with the correct application with the aim of achieving 100 per cent tagging of cattle at slaughter, was commenced.

Regulatory activity in the control of brucellosis and tuberculosis in cattle is summarized in the standard format adopted for the National Brucellosis and Tuberculosis Eradication Campaign, but does not include miscellaneous testing carried out in Residual Areas:

	30-6-80
Bovine Brucellosis for New South Wales—	
Herds (Total)	59 807
Dairy herds	3 297
Monitoring—	
● Abattoirs—	
Blood samples	520 189
Confirmed reactors	5 655
Confirmed reactors (per cent)	1.1
Herds in which reactors were found	2 389
● Milk Ring Testing (MRT)—	
Herds checked	3 297
Positive MRT herd tests	181
MRT herds blood tested	134
● Field Testing (6 per cent, or Routine, or Sample)—	
Herds tested	3 301
Cattle tested	90 510
Reactors	1 594
● Total Monitoring—	
Herds tested	40 891
Herds positive	3 014
Cattle tested	610 699
Reactors	7 249
Eradication—	
Infected herds during year—	
Herds tested during year	24 145
Blood samples tested	3 367 760
Reactors	21 573
Disposal of Reactors—	
Reactors for which compensation paid	14 541
Net compensation paid ($)	1 233 293
Vaccination—	
Cattle vaccinated with Strain 19	28 531
Doses of Strain 45/20 used	465
Laboratory—	
Blood samples tested—	
Serological tests	3 990 020
Bacteriological accessions	160

Infection Data—progress

Herd Status:

	1-7-79		30-6-80	
	No.	per cent	No.	per cent
Not assessed	34 029	(49.0)	14 301	(24.7)
Suspect	2 723	(3.9)	1 777	(3.1)
Infected	3 067	(4.4)	2 081	(3.6)
Restricted	2 591	(3.7)	2 275	(3.9)
Provisionally clear	3 038	(4.4)	3 111	(5.4)
Tested negative	20 361	(29.3)	21 119	(36.5)
Monitored negative	236	(0.3)	147	(0.3)
Confirmed free	3 452	(5.0)	13 016	(22.5)
Accredited free	7	(0.0)	13	(0.0)
Prevalence (per cent)—				
Herd	9.8		4.61	
Individual	0.2		0.16	

Bovine Tuberculosis for New South Wales—Provisionally Free Area

A. Basic Statistics—

1. No. of cattle herds	72 020
2. No. of cattle	7 139 126

B. Monitoring—

1. Abattoirs—	
(a) No. cattle slaughtered	2 171 942
(b) No. with TB lesions (presumed plus confirmed)	25
(c) No. successful tracebacks to herd of origin	22
(d) Percentage of successful tracebacks	88
2. Testing—	
(a) No. of cattle tested	9 236
(b) No. reactors	40
(c) Total No. herds tested	145
(d) No. herds confirmed infected	5
(e) No. herds tested from traceback	24

C. Eradication—

1. No. infected herds (F1 plus those detected during the year)	91
2. No. herds tested	92
3. No. cattle in infected herds	31 520
4. No. individual cattle tests	36 585
5. No. reactors	175

D. Disposal of Reactors—

1. No. reactors detected	214
2. No. reactors slaughtered	213
3. No. reactors autopsied (meatworks and field)	213
4. No. reactors with lesions	60
5. No. reactors for which compensation paid	160
6. No. casual cases for which compensation paid	1
7. Net compensation paid	$17,664.38

E. Laboratory—

1. No. bacteriological accessions	103
2. No. with confirmed tuberculosis	45

F. Infected Herds—

1. No. infected herds at beginning of year	56
2. No. cattle in infected herds at beginning of year	16,170
3. No. infected herds at end of year	20
4. No. cattle in infected herds at end of year	10 741

G. Prevalence (per cent)—

1. Herd	0.02777
2. Individual	0.00245

G 84737K—3

Quarantine was applied for the following diseases:

Disease	Properties	Stock
Anthrax	17	19 171
Lice in sheep	809	1 350 987
Ked in sheep	2	1 750
Tuberculosis in cattle	91	31 520
Tuberculosis in pigs	2	..
Tuberculosis in poultry	6	..

Prosecutions—

Relating to tail tagging	7
lice in sheep	9
footrot in sheep	2
swill feeding of pigs	1
illegal movement	2
Total	21

Stock Foods and Medicines Act, 1940

Stock Medicines—	
Re-registrations	1 498
New registrations	176
Refused	3
Stock Foods—	
Registrations	1 769
Prosecutions	11

Swine Branding Act, 1940

There were 948 brands registered.

Swine Compensation Act, 1928

Compensation was paid for 36 pig carcasses condemned during meat inspection.

Disease	Number of claims	Number of carcasses
Tuberculosis	3	28
Septicaemia	8	8

Veterinary Surgeons Act, 1923

The Veterinary Surgeons Board approved 115 new registrations and 1 126 re-registrations of veterinary surgeons. There were sixty investigations into complaints against veterinary surgeons. The Veterinary Investigations Committee investigated fifteen new complaints for professional misconduct, all of which were dismissed.

Wine Grape Processing Industry Act, 1979

Minimum prices determined by the New South Wales and Victorian Wine Grape Processing Industry Joint Negotiating Committee for the 1980 vintage were for Sultanas, $140/t and for Muscat Gordo Blanco, $145/t.

Quarantine Act 1908–73 (*Commonwealth*)

On behalf of the Commonwealth Government, the New South Wales Department of Agriculture administered sections of this Act relating to the importation of plants and animals and their products.

G 84737K—4

Activities under Quarantine Act—

	Number	
Passenger clearance—		
By sea—		
Vessels met	94	
Passenger arrivals	55 806	
Quarantine interceptions	687	
By air—		
Flights met	6 939	
Passenger arrivals	1 434 930	
Quarantine interceptions	158 475	
	Plant	Animal
Prosecutions—		
Quarantine Act (Commonwealth)	15	9
Customs Act (Commonwealth)	84	66
Both Acts	155	67
Quarantine—		
Fees collected	$803,532	$146,395
Parcels post—		
Parcels examined	16 449	7 140
Parcels needing quarantine action	4 051	789

Plant quarantine—

	Number
Import permits issued	50 310
Cargo—	
General—	
Vessels attended	553
Seed sampled for examination	881
Vehicles steam cleaned	3 614
Containerized cargo—	
Vessels plying Sydney port	1 085
Containers discharged	151 482
Action on containers*—	
FCL's immediate delivery	80 687
FCL's and LCL's depot inspection	68 089
FCL's country inspection	1 314
FCL's city approved premises	1 392
FCL follow-up inspections revealing infringements	62
International airport terminal	39 508 t
Richmond RAAF terminal	6 068 t
Timber imports	522 371 m³
Quarantine treatment	19 532 m³
Approved premises for processing	129
Personal effects examined (consignments)	3 274
Personal effects quarantined (consignments)	1 640
Nursery stock—	
Total imports (items)	29 393
Ornamentals to approved quarantine houses	23 454
Plant Quarantine Station—number of lines, being—	
Seeds for Department and universities	162
Seeds for private imports	6
Fruit trees for Department	63
Other introductions for Department	18
Plants for private importers	568
Exotic pest interceptions (occasions)—	
Giant African snail *Achatina fulica*	7
European wasp *Vespula germanica*	1
Carpenter ants *Camponotus pennsylvanicus*	5
Dampwood termites *Cryptotermes angusticollis*	2
Siricidae spp.	4
Trogoderma glabrum	1
Exotic fruit fly *Dacus frauenfeldii*	1
Dacus frivialis	1
Tephritidae	1
Exotic snail *Polygyra spetomvolva*	1
Exotic leaf miner *Agronyzadie*	1

* FCL, full container load; LCL, less than full container load.

Animal quarantine—

	Number
Permits issued	1 900
Animals landed—	
Domestic livestock	2 096
Animal pets	1 394
Aquarium fish	3 104 466
Others	2 323
Animals entering quarantine—	
Dogs and cats	306
Horses and donkeys	305
Semen imported—	
Cattle (doses)	19 319
Animal product imports—	
Landings permits issued	2 463
Main products landed (t)—	
Tinned meats	815
Chilled/frozen meat	1 340
Cheese	4 293
Fish products	2 455
Hide and glue pieces	1 132
Fish meal	9 477
Stock feed	1 171
Wool	1 270
Ship's pets—	
Animals bonded	307
Fish bonded	2 078
Animal exports—	
Health certificates issued	2 265
Main exports—	
Domestic livestock	2 696
Animal pets	2 452
Birds and poultry	7 149
Day-old chickens	527 017
Hatching eggs	373 096
Others	1 519

Commerce (Trade Descriptions) Act 1905 (*Commonwealth*)

The following items were inspected under the export regulations and health certificates endorsed with treatments supervised for importing countries:

Grain—

	Tonnes	
	Inspected	Rejected
Ships surveyed for grain export (number)	151	54
Wheat	3 185 676	43 181
Sorghum	139 661	..
Barley	79 482	6 769
Flour	..	..
Oats	38 821	..

Fresh fruit and vegetables—

	Packages	
	Inspected	Rejected
Apples	137 344	4 514
Pears	89 908	5 007
Citrus	126 772	3 696
Stone Fruit	87 610	3 710
Grapes	48 344	3 600
Strawberries	7 908	553
Tomatoes	34 308	232
Potatoes	34 562	699
Onions	25 183	..
Other fruits	42 621	1 399
Other vegetables	92 282	304

SUMMARY OF LEGISLATIVE ACTIVITIES

The following legislation was undertaken:

- Acts—

  Noxious Insects (Amendment) Act, 1979
  Stock Diseases (Amendment) Act, 1979
  Horticultural Stock and Nurseries (Amendment) Act, 1979
  Meat Industry (Amendment) Act, 1979
  Pastures Protection (Amendment) Act, 1979
  Canned Fruits Marketing Act, 1980
  Meat Industry (Amendment) Act, 1980
  Dairy Industry Marketing Authority Act, 1980
  Wheat Marketing Act, 1980
  Pastures Protection (Further Amendment) Act, 1980

- Regulations—

	Number of Amendments
Pesticides Act, 1978	1
Meat Industry Act, 1978	7
Sydney Farm Produce Market Authority Act, 1968	1
Cattle Compensation Act, 1923	1
Stock Diseases Act, 1923	2
Swine Compensation Act, 1928	1
Stock Foods and Medicines Act, 1940	1
Dried Fruits Act, 1939	1
Marketing of Primary Products Act, 1927	3
Pastures Protection Act, 1934	3
Noxious Insects Act, 1934	1
Veterinary Surgeons Act, 1923	1
Wine Grape Processing Act, 1979	1
Stock (Chemical Residues) Act, 1975	1
Agricultural Seeds Act, 1921	1

DISEASE AND PEST CONTROL—REGULATORY

Brood Disease of Bees

Both European and American brood disease have occurred in some apiaries and $14,200 has been paid in compensation to beekeepers.

Bunchy Top Control in Bananas

Detections this year were slightly higher than in 1978–9 but the overall situation has improved over the past two years. This followed implementation of the scheme of buying and destroying chronically diseased plantations with finance provided by the Government and industry on a two to one basis. Two infected plants were detected at the Tropical Fruit Research Station at Alstonville being the first detections in the Richmond district for six years. An area of 0.3 ha was removed from around the infected plants.

Fruit Fly

Dry seasonal conditions did not favour a fruit fly build-up during the year. Periods of peak activity varied considerably between districts and generally followed the rainfall pattern. The Murrumbidgee and Murray Irrigation Areas remained free of fruit fly. One minor infestation was recorded at Narrandera but the majority of towns adjacent to these areas remained free. This was attributed to whole town treatment programmes applied by local councils and supported by additional treatments applied by Departmental inspectors.

Grain Pest Trace-Back Programme

This programme entered its second year with only 19 properties requiring inspection as a result of refusals to accept grain at silos due to insect infestation. Only two properties required re-inspection following initial visits by inspectors and none were the subject of inspection during the previous year. In the previous season, 81 properties had to be inspected.

Warehouse Beetle

The original programme to eradicate this pest from the rice milling industry of the M.I.A. was modified by the SCA Consultative Committee to one of containment and suppression in the Griffith township and eradication in other districts. This followed the detection of nine separate infestations in commercial premises in Griffith. Outbreaks were also detected in a seed distribution firm at Dubbo and in the dry conditioning rooms of three seed distributors in Sydney. Measures taken appear to have eradicated warehouse beetle from these premises. The eradication programme in M.I.A. areas (other than Griffith) is proceeding satisfactorily.

Weeds

Serrated Tussock: Increased noxious plant grants were again made available to councils working on this weed. A working party was set up to examine and report on action required to increase the rate of the attack on serrated tussock.

Johnson Grass: Approximately $200,000 of grant and council funds were allocated to developing programmes along the Gwydir, Namoi and Macquarie River watersheds. A further programme was initiated for the Lachlan River watershed.

Aquatic Weeds: The eradication of water hyacinth at Moree proceeded most satisfactorily. Following localized flooding, seedlings developed over some 1 000 ha and are being treated. It is now three years since any plant flowered or survived a season.

Alligator weed continues to infest several areas around Williamtown. Although biological control has been most effective in the Georges River, the insects released have not been effective on terrestrial situations or near Williamtown.

Noogoora and Bathurst Burrs: These weeds are widespread and in western areas are resulting in restrictions on stock entering South Australia. Whilst rust has been found on Noogoora burr in most of the north and the south-west of the State, damage is not sufficient to regard it as effective for control of the weed. Chemical methods are unrealistic in the Darling, and west of the Darling areas on economic grounds.

Weevil Borer of Bananas

Weevil borer has continued to spread in southern banana districts and has reached Woolgoolga north of Coffs Harbour, and Yarrahappini, south of Macksville. The industry scheme for detection and control is now likely to be terminated with the onus for control reverting to owners.

CATTLE TICK AND TICK FEVER CONTROL

Control of cattle tick (Boophilus microplus) within the infested area in the north-east of New South Wales is exercised by the Board of Tick Control under the jurisdiction of the Department of Agriculture.

Thirty infestations were detected during 1979–80 (21 in 1978–9) and one holding was infected with tick fever out of a total of 6 662 in the Tick Quarantine Area (TQA). For the third successive year since 1974, all holdings in the TQA were involved in either a dipping or examination programme; 4 580 holdings with 330 000 cattle in the northern part of the area underwent 5 to 9 treatments, all commencing in October. In the southern section 2 043 holdings with 143 000 cattle underwent 2 examinations commencing in February. In Cullendore, 39 holdings with 11 000 cattle had 4 examinations between February and May with a view to releasing the area from Quarantine. Twelve infestations were detected in the dipping area and 16 in the southern area not subject to an annual dipping programme. Two infestations were recorded in Cullendore. Twelve holdings were given additional treatments or examinations due to serious breaks in the annual dipping programme. Of these one was subsequently found infested.

The most significant development was a review of policies and programmes made in the second half of the year. A report is expected early in the new year.

Laboratory testing for acaricide resistance revealed the presence of the organophosphorus (OP) resistant strain, Biarra, by itself or with the other OP strains of Mackay, Ridgelands and Ingham. Tests also indicated a high level DDT and low level amitraz resistance on one property.

Eleven hundred dips were used in the area for policy, infestation, movement and voluntary treatments, involving 2.75 million individual dippings of cattle. There were about 3 000 dippings of horses.

Eight hundred and twenty dips charged with Taktic (R) and 12 with Tifatol (R) were used mainly in the dipping area. Most of the 270 Promicide (R) dips served the non-dipping area.

Safeguarding (childproofing) of about 1 100 dips was completed.

The Laboratory of the Board of Tick Control at Lismore carried out 15 560 acaricide and lime estimations and 5 633 mud estimations on dip samples. Analyses of 11 122 samples were done for residues. These included 10 213 original and 601 traceback beef fat samples and 77 traceback samples of other materials for the Statewide Pesticide Residues Survey. The remaining 231 samples were for trial and post-mortem examinations.

Major activities

Activity	Number		
	Cattle	Horses	Carcasses
Examinations	1 974 428	35 314	322 468
Dippings	2 750 543	2 760	
Sprayings	12 405	31 149	
Policy examinations	342 870		
10 per cent examinations	275 054		
Stock movement control	1 008 554	18 989	
Vehicular movement through gates	6.6 million vehicles.		

Queensland Border Control

To prevent cattle ticks from entering New South Wales, control was maintained on the introduction of livestock, plants and some animal products. Inspectors on the Queensland border supervised the entry of 258 126 cattle, 385 986 sheep, 29 630 pigs, 5 287 horses, 10 590 goats and 99 other animals.

TECHNICAL SERVICES

Market Reporting Service

The Division of Marketing and Economics continued to collect and disseminate market price information. Reports covering supply, demand, quality, prices and price movements were issued each day the respective market traded in:

(a) Fruit, vegetables and cut flowers at Flemington Markets, Sydney.

(b) Livestock at Homebush, Wagga Wagga, Dubbo, Tamworth, Gunnedah, Armidale, Casino and Moree (the latter being added during the year). Planning commenced to include Goulburn in the network.

In addition, retail prices of fruit, vegetables, fish and meat were also collected daily at various retail outlets throughout the Sydney Metropolitan Area; and prices for grains, hay, butter and cheese, bacon and hams, honey, bran, pollard and eggs were collected and reported on a weekly or fortnightly basis. Records of selected arrivals into Sydney of various primary products, from both interstate and intrastate sources, were maintained.

Reports have been issued in printed form and over radio. Daily wholesale quotations include fruit, vegetable, cut flower, wholesale meat and fish information and were issued to the daily press, the trade, periodicals, various State and Federal Departments, and other bodies. Weekly marketing notes are widely distributed and summarize the week's activities in all markets. In excess of 90 radio reports were broadcast each week, based on information collected by the Market Reporting Service.

Seasonal Pastoral and Crop Condition Reports

Publication continued of the monthly Report on Production Trends which included a summary of seasonal conditions and comment on the seasonal progress and production prospects for over 20 of the more important crops grown in New South Wales. Also included were details of monthly slaughtering and production figures for cattle, sheep, lambs, pigs and poultry as well as production figures for butter, cheese, milk and eggs; wool receivals and sales through brokers' stores were also covered. The monthly survey of New South Wales Pastoral Conditions continued to report on seasonal conditions, the pasture and feed situation, the condition of stock and the noxious pest problems in over 50 districts of the State. Special seasonal and crop condition reports were again prepared each month for the Department of Trade and Resources, Sydney, and the Bureau of Agricultural Economics, Canberra.

Drought/Bushfire/Flood Relief

The Department administers road freight concession schemes following these natural disasters. It also administers the following drought relief schemes: Provision and cartage of water and cattle slaughter compensation. Serious drought conditions were experienced throughout New South Wales during the year. In July, 1979, 11 pastures protection districts were affected and the number increased to 48 of the State's 58 districts declared drought affected in May, 1980; 46 of these were still drought declared at 30th June, 1980.

Animal Health Diagnostic Services

Intake of consignments of specimens to Departmental veterinary laboratories increased by 37 per cent over the previous year. This was a general increase over all species and sources and included additional specimen consignments associated with the National Brucellosis Eradication Campaign involving 3 990 020 serum samples.

Origin and source of specimen consignments other than those directly concerned with the Brucellosis Eradication Campaign.

Animal	Glenfield	Armidale	Wagga Wagga	Wollongbar	Total
Cattle	6 794	677	640	1 263	9 374
Sheep	2 001	383	1 317	41	3 742
Pigs	420	172	292	329	1 213
Poultry	535	244	106	68	953
Other animals	917	882	498	1 192	3 489
Other specimens	269	31	3	24	327
Total	14 106*	2 389	2 856	2 917	22 268
Private Practitioners	5 059	1 236	1 615	1 603	9 549
Veterinary Inspectors	2 718	495	730	491	4 434
Departmental Officers	2 886	458	412	808	4 564
Others	273	200	63	15	551
Total	10 936	2 389	2 856	2 917	19 098

* Includes an additional 3 170 consignments handled by the specialist Veterinary Laboratories at Glenfield.

Dairy Product Quality Assurance

The Department took 660 samples of New South Wales, interstate and imported dairy products which were subjected to 2 233 chemical and 2 814 microbiological tests. A total of 305 159 (25 kg) boxes of butter and 6 237 boxes of cheese were graded.

Livestock Recording Services

The Department operated the following services:

- A dairy herd recording service for 850 farmer members covering 19 per cent of the State's dairy cattle population.
- From April, 1980, a completely revised and upgraded computer system for processing of herd recording data including details for monitoring of Contract Mating of Elite Cows and the Sire Evaluation Plan.
- A fleece measurement service from Trangie Agricultural Research Station which processed 30 065 wool samples from 121 studs.
- A random sample layer test attracted entries from three States. Information from these tests was supplied on the production potential of all major local strains of poultry.

Sheep Fertility Service

The Sheep Fertility Service continued to operate in the southern areas of the State where problems related to oestrogen-producing pastures continue to exist.

Public Watering Places

The Department continued to maintain and improve public watering places on stock routes in the Western Division, which involved the expenditure of $150,000 in addition to that provided by Western Division Pastures Protection Board rentals.

Plant Health Diagnostic Services

The Biology Branch at the Biological and Chemical Research Institute examined 1 418 plant specimens for disease and 1 829 samples for parasitic nematodes. During the year 1 600 specimens were added to the herbarium and 40 plant diseases were recorded for the first time in this State.

The Entomology Branch identified 3 755 specimens of insect and mite pest problems on plants and plant products and added 4 108 specimens to its collection.

Chemistry Branch Services

The following services were provided from the Biological and Chemical Research Institute and from regional laboratories.

Analytical	Number of samples	Number of analyses
Plant analysis	6 448	38 632
Soil chemistry	12 452	84 792
Soil physics	2 333	8 014
Fertilizer analysis	89	150
Water analysis	1 287	14 807
Stockfeed analysis	534	1 288
Oilseed analysis	31	167
Pesticide analysis	1 053	4 107
Biochemical assays	210	210
Essential oil analysis	50	75
Cereal quality evaluations	2 550	12 700
Body composition—poultry	908	1 478

Advisory	Number of reports
Plant nutritional diagnoses	947
Soil fertility assessments	4 148
Soil suitability assessments	190
Water quality assessments	984
Pesticide advice	100
Essential oil quality assessments	50
Cereal export certification	50
Soil profile descriptions	42
Others	62

Certified Seed Production

New certification schemes were commenced during the year for Palestine strawberry clover, Bloodwood adzuki bean and Opal chickpea. 1 142 t of certified pasture seed were produced, the main species being subterranean 584 t and lucernes 176 t. Of the field crops 526 t were produced which included 384 t of lupins and 137 t of certified maize.

Seed Testing

The Seeds Laboratory tested 7 253 seed samples as follows:

Type or source of seed	Number of samples
Quarantine (export and import)	1 229
Regulatory (taken by Departmental Inspectors)	109
Certified—	
Pasture	320
Maize and sorghum	199
Lupin	57
Industry—	
Miscellaneous	1 373
Rice	..
Registered cereal seed	957
Departmental	300
Other departments (including Police)	72
Seeds for identification	117
Australian wheat collection (equivalent to 1/8 normal sample)	2 520
Total	7 253

Australian Inoculants Research and Control Service

This service was established, and is financed by, the Australian Agricultural Council to control the quality of legume inoculants prior to release and to test the standard when available at retail outlets in all States. A total of 152 cultures were tested during production and of these 127 were passed. Of 55 packeted inoculants tested from retail outlets, 44 reached the necessary standard.

Remote Sensing

The continued development of remote sensing technology using both satellite data and high altitude technology has enhanced the Division's role in such areas as wheat area monitoring and weed assessment in rice.

Polls under the Marketing of Primary Products Act

Four polls for the triennial election of producers' representatives were conducted by the State Electoral Office in conjunction with the Division of Marketing and Economics. The sitting members as the only candidates were declared elected unopposed to the Rice Marketing Board (five members re-appointed for a three-year term from 9th November, 1979) and to the Tobacco Leaf Marketing Board (three members re-appointed from 6th August, 1980). In the election to the Rice Marketing Board, candidates in two districts were unopposed but five candicates nominated for three positions in one district. Following election the three successful candidates and the two unopposed candidates were appointed from 16th November, 1979. Eight persons nominated for election to the Grain Sorghum Marketing Board and the five successful candidates were appointed from 18th June, 1980.

Argentine Ant Eradication Campaign

The Director, Pesticides and Environmental Studies, maintained an administrative and advisory role in the Argentine Ant Eradication Campaign, which is jointly carried out with Local Government. Departmental staff were involved in the campaign activities which included a check survey of 4 849 properties, totalling 59 ha.

Infestations	Number	Spraying	Area (ha)
New, found by—		Total	78.5
Staff	1	Spot sprayed (2 areas)	0.28
Public	3		
Persisting	..		
Re-infestations	..		

EDUCATION

The Department continued emphasizing its vital role in agricultural education through the C. B. Alexander Agricultural College at Paterson and the Yanco Agricultural College, Yanco. The Department also maintained an administrative role at Orange Agricultural College, where tertiary courses in agriculture were offered for the Associate Diploma in Farm Management and the Associate Diploma in Farm Secretarial Studies.

At Orange Agricultural College new enrolments were accepted into the Associated Diploma in Environmental Control. This is a joint course with Mitchell College of Advanced Education. The course is two years full-time and will be offered externally from August, 1980. Mitchell College has responsibility for Semester I of the Course, Orange College for Semester II and thereafter students specialize into one of four areas. The College has responsibility for one of those areas, viz., the Land Use Strand.

Administration of the Department's agricultural education was formerly carried out by the Agricultural Education Secretariat, which was disbanded during the year as a result of the re-organization of the Division of Extension Services. The agricultural education role is now embodied in the Division's administrative structure under direct supervision of the Chief of the Division. This innovation recognizes the important relationship between the Department's functions of extension and education.

The Department has also given priority to agricultural education through correspondence courses conducted by the Division of Extension Services in association with the Rural Youth Council, which is reported upon elsewhere in this report. Courses are conducted in Farm Management and Farm Office Management.

A new course for dairy apprentices was started at the C. B. Alexander College. This course provides two options: a three year part-time course and a full-time course for one year followed by an apprenticeship for two years. The first 17 students in the part-time course commenced studies in May, 1980, and the first pre-apprenticeship course will commence in February, 1981, at both C. B. Alexander College and Yanco Agricultural College.

The Yanco Agricultural College was represented in the curriculum design committee for the dairy apprenticeship courses.

The College has accreditation to conduct a pre-apprenticeship course in dairying which will be offered in 1981.

The Advanced Irrigation Certificate Course has been drastically altered, not in content, but in method of presentation. The course is now in units, to allow concentration on particular aspects of irrigation. This was done basically to allow Departmental Officers in training to complete specific irrigation studies but not be involved in the whole course.

Similarly, industry representatives are able to attend on the same part-time basis.

The College Advisory Councils for the Tocal and Yanco Colleges continued to play an active role in consultative management of College resources and curriculum design. Meeting at regular intervals the Councils also reviewed and reported on farm activities; capital works and planning; land use and development of land resources and educational and recreational programmes for college students and participants of short courses conducted at the Colleges.

The Board of Rural Studies met twice during the year to receive reports, monitor activities and offer guidance to the College Advisory Councils.

STUDENT STATISTICS

Colleges and Courses	Enrolment		1979 Final Examination	
	1979	1980	Sat	Passed
C. B. Alexander Agricultural College—				
Certificate in Agriculture	85	86	76	72
Advanced Certificates in Agriculture	55	62	55	50
Total	140	148	131	122
Yanco Agricultural College—				
Certificate in Agriculture	69	71*	59	56
Advanced Certificate in Agriculture	7	22	7	6
Advanced Certificate in Irrigation	2	12†	2	2
Advanced Certificate in Pastoral Zone Management	3	5	3	3
Total	81	110	71	67
Total for the two Colleges	221	258	202	189

* Includes 3 Libyan students approved by F.A.O.

† Includes 6 part-time students (Departmental Officers in Training).

Colleges and Courses	Spring Semester 1979		Autumn Semester 1980	
	Full-time	Part-time	Full-time	Part-time
Orange Agricultural College—				
Associate Diploma in Farm Management	83	..	109	..
Associate Diploma in Farm Secretarial Studies ..	52	49	88	69
Total	135	49	197	69

N.B. Courses at Orange College have been unitized. Each unit carries a specific number of credit points and a student needs at least 100 credit points to gain a pass. The re-structuring of the courses provides a wide range of subjects for election over a number of semesters.

STAFF ESTABLISHMENT AS AT 30TH JUNE, 1980

Location	Professional				General				
	Res.[1]	Educ.[2]	Admin.[3]	Total	Res.[4]	Other[5]	Total	Admin. and Clerical[6]	Total
Orange	..	19	1	20	..	29	29	13	62
C. B. Alexander	..	11	1	12	..	41	41	7	60
Yanco	..	12	1	13	..	52	52	6	71
Division of Extension Services	1	..	..	1	..	..	..	..	1
	1	42	3	46	..	122	122	26	194

[1] Professional officer whose time is predominantly occupied on research projects.

[2] Professional officer whose time is predominantly occupied on education.

[3] Professional officer whose time is predominantly occupied on administrative or other activities.

[4] Clerical assistant whose time is predominantly occupied in assisting the research officer.

[5] Other General Division and ministerial staff. Typists, office assistants and clerical assistants are included in these figures.

[6] Only accounting machine operators, stenographers, male clerical positions and library officers are included in these figures.

Yanco Agricultural College

Short-term Schools and Courses—

Course	Duration	Number attending	Sponsor
Irrigation	1 week	32	Rural Youth and Bank of N.S.W.
Irrigation	2 days	40	Narrandera L.G.P.A.
Landforming for Irrigation	1 week	12	.....
Farm Accounting for Farmer's Wives	½ day per week for 8 weeks	12	.....
Accounting for Graziers	1 week	14	.....
Accounting for Graziers	1 week	10	.....
Tractor Operation for C.Y.S.S.	3 days	12	C.Y.S.S. Committee of Leeton.
Tractor Operation for C.Y.S.S.	3 days	9	C.Y.S.S. Committee of Leeton.
Rural Youth	4 days	30	Rural Youth.
Pig Farming	4 days	30	.....
Working Sheep Dogs	3 days	20	Working Sheep Dogs Association.
High School Principals	1 week	36	Department of Education.
Link Programmes for High School Students—			
Yanco Agricultural High School	1 day	24	.....
Tumut High	1 day	45	.....
General Agriculture	1 day	40	T.A.F.E.
Youth Leadership	1 week	42	Leeton Lions Club.
Grain Elevators Board Operators (8 separate schools).	3 days	12 (96 total)	Grain Elevators Board.
Creative Writing	1 day	30	Arts Council.
Drama	1 day	28	Arts Council.
Photography	1 day	30	Arts Council.
Milking Machine Maintenance	1 day	12	.....
Basic Agriculture (Jackeroos)	2 days	22	Boonoke Pastoral Co.

C. B. Alexander Agricultural College

Short-term Schools and Courses—

Course	Duration	Number attending	Sponsor
Residential Angus Cattle Judging School	3 days	40	Angus Society.
Psychotherapy Course	5 days	14	Department of Community Programmes, University of Newcastle.
Farm Office Management Course	2 days	16	Department of Agriculture and C. B. Alexander Agricultural College.
Refresher Course for Ex-students on "Recent Developments in Tillage Practices".	2 days	15	C. B. Alexander Agricultural College.
Refresher Course on "Horse Foot Care"	2 days	20	C. B. Alexander Agricultural College.
Farm Technology Demonstrations for Rural Youth Students.	2 days	16	C. B. Alexander Agricultural College.
Conference of Hunter Region Social Studies Curriculum Committee.	1 day	22	Hunter Region Social Studies Curriculum Committee.
Horse School for Rural Youth	5 days	40	Division of Extension Services and C. B. Alexander Agricultural College.
Friesian Cattle Judging School	4 days	35	Friesian Cattle Society.
Music School	5 days	30	Department of Community Programmes, University of Newcastle.
Australian Illawarra Shorthorn Judging School	4 days	15	A.I.S. Cattle Society.
Junior Cattle Judging Competition	1 day	30	Agricultural Show Societies' Council.
Advanced Psychotherapy Course	4 days	26	Dr Wendy Cook.
Summer School for Men and Women Interested in Rural Pursuits.	4 days	35	Department of Community Programmes, University of Newcastle and C. B. Alexander Agricultural College.
Music Course	5 days	40	St Mary's Band Club.
Lucerne Variety Field Day	1 day	40	Mr D. Daines, District Agronomist, Department of Agriculture, Maitland.
Psycho-drama Course	7 days	16	Department of Community Programmes, University of Newcastle.

Orange Agricultural College

Short-term Schools and Courses—

Course	Duration	Number attending	Sponsor
South Devon Association Meeting..	1 day	15	South Devon Association.
Regional Staff Development Conference for Secretarial Studies.	2 days	30	Orange Technical College.
Farm Office Short Course, Quirindi	2 days	25	O.A.C., Department of Agriculture.
Farriering and Hoof Care Short Course	2 days	14	O.A.C.
Orange TAFE Committee Meeting, Orange, attended by R. J. Napier.	1 day	12	Orange Technical College.
Advanced Farrier and Hoof Care	2 days	12	O.A.C.
Training Workshop	3 days	11	F. R. Strange Pty Ltd.
Interior Decorating and Handicraft Workshop ..	2 days	30	Rural Youth.
Pest Control Staff Conference	4 days	20	Grain Elevators Board.
Pastures Protection Board Conference, Forbes, R. J. Napier, Speaker.	1 day	50	Pastures Protection Board.
Orange Rotary Club Function—Wool Shed ..	1 day	30	Rotary Club.
Tukidale Sheep Society Meeting and Demonstrations.	1 day	50	Tukidale Sheep Society.
Farm Management Society Annual Dinner—Guest Speaker, Mr Walter Ives (Chairman Primary Industry Bank of Australia).	1 day	53	Farm Management Society.
Rotaract, Orange Branch Monthly Meeting and Tour of Campus.	1 day	40	Rotaract.
Agricultural Bureau Meeting, Junee—Speaker R. J. Napier.	1 day	50	Agricultural Bureau.
Australian Veterinary Association Dinner ..	1 day	16	Australian Veterinary Association.
Australian Farm Management Society, Central West Branch Executive Meeting.	1 day	5	Farm Management Society.
Orange TAFE Committee Meeting, Blayney—attended by R. J. Napier.	1 day	12	TAFE.
Orana Rural Training Committee Meeting, Dubbo—attended by R. J. Napier.	1 day	8	O.R.I.C.
Dentists Convention Seminar	1 day	45	O.A.C.
Yates Research Station Opening, Narromine—attended by J. Davis.	1 day	..	Yates.
Institute of Agricultural Secretaries of Australasia Meeting, Sydney—attended by R. J. Napier.	1 day	8	I.A.S.A.
Metropolitan Careers Advisers Visit	1 day	25	O.A.C./M.C.A.E.
Debate on "Youth Employment in Regional Areas of N.S.W.".	1 day	40	Young National Country Party.
Agricultural Bureau Meeting, Canberra—Speaker R. J. Napier.	1 day	60	Agricultural Bureau.
A.L.P. Rural Policy Seminar, Orange—attended by R. J. Napier.	2 days	..	A.L.P.
Department of Agriculture Communications Course.	6 days	20	Department of Agriculture.
View Club Dinner, Young—Speaker R. J. Napier	1 day	100	View Club.
Seminar on Accounting for Primary	1 day	35	A.S.A./O.A.C.
Agricultural Technologists of Australasia Dinner at Newhaven Par—attended by R. J. Napier and J. Davis.	1 day	..	A.I.A.
Australian Veterinary Association Dinner—attended by E. R. Hunt.	1 day	12	Australian Veterinary Association.
Final Seminar on Education at M.C.A.E.—paper presented by R. Tonkin.	1 day	40	Regional Committee.
Arabian Horse Society Meeting	1 day	30	Arabian Horse Society.
Pony Club Association of N.S.W. Instruction Day	1 day	45	Pony Club Association of N.S.W.
Rural Youth Day	1 day	30	Rural Youth.
Dalgety-Winchcombe Seminar	3 days	53	Dalgety-Winchcombe.
Department of Education, History Conference ..	3 days	36	Department of Education.
Bankers Short Course	6 days	31	Rural Australia Foundation.
Farriery Short Course	2 days	14	O.A.C.
Agricultural Bureau of N.S.W. Annual	5 days	111	Agricultural Bureau of N.S.W.
Walkathon—De La Salle School—shearing shed for barbecue.	1 day	..	R. van Gelder.
Continuing and Community Education Workshop at Ryde—attended by R. Tonkin.	1 day	20	Board of Adult Education.
Agricultural Bureau Meeting, Parkes—Speaker J. W. Chudleigh.	1 day	40	Agricultural Bureau.
Australian Farm Management Society, Central West Branch.	1 day	15	A.F.M.S.
Parents Weekend	2 days	65	O.A.C.
Workshop—Extension Planning and Educational Design.	5 days	23	Department of Agriculture.
Grain Elevators Board Training School	5 days	20	Grain Elevators Board.
Graduates' Association Short Course and Social Weekend.	2 days	32	Graduates Association.
Grain Elevators Board Training School	4 days	20	Grain Elevators Board.
Dalgety-Winchcombe Stock Marketing Seminar..	3 days	42	Dalgety-Winchcombe.
University of N.S.W. Geography Students (in residence)—Field Trip.	3 days	17	University of N.S.W.
Young National Country Party Meeting	1 day	25	Young National Country Party.
Production of Farm Secretary Film	3 days	..	Institute of Agricultural Sciences O.A.C.

Orange Agricultural College—(continued)

Course	Duration	Number attending	Sponsor
Australian Farm Management Society Meeting of Central West Branch.	1 day	12	A.F.M.S.
National Trust Dinner, O.A.C.—attended by R. Tonkin.	1 day	300	National Trust.
Workshop for High School Mathematics Teachers	1 day	28	Department of Education.
Winter Crops Seminar	1 day	13	O.A.C.
Seminar—"Homestead and Landscape Design for Energy Efficient Living".	1 day	25	Rural Australia Foundation.
Orange TAFE Committee Meeting—attended by R. J. Napier.	1 day	15	TAFE
Field Days Accommodation	4 days	70	O.A.C.
Rural Australia Foundation Directors Meeting ..	1 day	6	Rural Australia Foundation.
U.S. Farmers Visit to O.A.C.	1 day	40	Orange Rotary Club.

Number of activities—62.

Number of people involved—2 046.

PART B – ADMINISTRATION

CENTRAL ADMINISTRATION

DEVELOPMENTS

The advent of the Public Service Act, 1979, added a wide range of responsibilities to the Department's administration and a new position of Executive Officer (Administration) was established. The duties of the position involve monitoring the way the administrative functions of the Department work at head office, divisional and regional levels; generally supervising staffing, recruitment and personnel functions; looking at and making recommendations about improvements to the Department's administration and structure; and acting as Executive Officer for the Department's Exotic Disease Task Force.

The Personnel Section and the Staff Development Section were re-organized to form the Personnel Resources Branch. The re-organization was the result of a re-definition of the aims, roles and functions of the two former sections. The new Branch has responsibility for all personnel and staff development matters. Linked to this re-organization was another new initiative—the formation of a Staff Committee. The Committee reviews and makes recommendations in respect of administrative and clerical staff.

The Department also established a position of Industrial Relations Officer. The position carries responsibilities for liason, co-ordination, research and policy formulation with respect to all matters in the Department that have industrial implications.

The Central Secretariat was re-organized to form the Executive Secretariat.

BRANCHES AND SECTIONS

Executive Secretariat

Provides secretarial and service assistance for the Minister and the Executive, keeps central records and handles general correspondence. Assists in the preparation of agenda papers for meetings of the Standing Committee on Agriculture and the Australian Agricultural Council. Registers Head Office policy files, opens and sorts Departmental mail, receives acquittances and supervises Departmental cars assigned to the Executive.

Staff Branch

Responsible for the payment of salaries and wages and processing matters related to appointments, transfers, resignations, retirements, incremental progression, promotions, workers' compensation and leave. Pays relieving allowances, processes the employment of casual Clerical and General Division staff and prepares correspondence and submissions to the Public Service Board. Maintains establishment and personal history records and arranges approvals for officers to proceed on study leave and overseas on official business.

Accounts Branch

Deals with financial matters including collecting revenue, ordering equipment, stores and services, checking and paying claims for supplies and services, cattle compensation, travelling expenses, natural disasters, relief claims (drought, flood, bushfires, etc.). Prepares estimates for expenditure and revenue and financial reports for the Treasury and bodies that provide grants for specific purposes. Other major functions include the processing of the Department's payroll, the maintenance of financial records and the inspection of the accounts at city and country locations.

Legal Branch

Prepares legislation, drafts regulations, notifications and proclamations; conducts prosecutions; prepares legal documents—leases, bills of sale, building agreements; prepares legal advisings and is responsible for licensing.

Personnel Resources Branch

Concerned with recruitment, induction, training, promotion and counselling of staff. Publicises interprets and oversee's recruitment policies and guidelines and encourages and supervises the personal development of staff, including managing and processing matters such as study leave, study assistance staff appraisal systems, job experience programmes.

Management Services Branch

Reponsible for office and ancillary accommodation, layout of offices, office housekeeping and office facilities, including furnishings, telephones, telex machines and aids, forms design and organization and methods survey.

Pesticides Registration Section

Responsible for the administration of the Pesticides Act, 1978, and allied matters.

Pesticides and Environmental Studies

Responsible for the review, development and co-ordination with other Divisions, Branches, Departments and Authorities, of research and extension relating to pesticide residues and other environmental problems.

Foreign Aids Support Unit

Administers the Department's involvement in overseas aid projects and training programmes sponsored by the Australian Development Assistance Bureau.

COMMITTEES, COUNCILS AND TRUSTS

Australian Agricultural Council

The Council, which comprises principally the Ministers for Primary Industry and Agriculture of the Commonwealth and the States, met on two occasions during the year, at Perth and Melbourne.

Important topics dealt with at these meetings included wheat marketing pricing arrangements, carcass classification, animal and plant diseases and the funding of joint State and Commonwealth programmes.

Standing Committee on Agriculture

Meetings of Standing Committee, which are attended by delegations from all States and the Commonwealth led by the Department heads were held on three occasions. Once in Perth, once in Melbourne and once in Sydney. Two of the meetings were held in conjunction with the meetings of the Australian Agricultural Council and a special meeting was held in Sydney.

The main topics discussed at the Perth and Melbourne meetings were wheat marketing pricing arrangements, carcass classification, animal and plant diseases, including bluetongue and screw-worn fly, maximum residue limits for agricultural chemicals, remote sensing and the funding of various co-operative programmes.

At the special meeting in Sydney, discussions centred on research and extension priorities.

Farrer Memorial Trust

During the period under review one annual and one ordinary meeting were held.

Total funds held by the Trust at 31st December, 1979, amount to $56,855, comprising of investments of $53,820, cash at bank of $667, accrued interest of $1,948 and assets of $420. Donations were received during the year totalling $4,000 to which must be added the sum of $400 received from the Rural Bank of New South Wales (for assistance with staging the 1979 Farrer Memorial Oration) and $600 donated by the N.S.W. Flour Millers' Council as a direct subsidy of allowances paid to the 1979 Farrer scholar. The Auditor-General of New South Wales has certified that an examination of trust accounts at 31st December, 1979, was satisfactory.

The 1979 Farrer Memorial Medal was presented to Dr L. T. Evans who is an officer of the Commonwealth Scientific and Industrial Research Organization. Dr Evans was presented with the medal and delivered the 1979 Farrer Memorial Oration entitled "Response to Challenge—William Farrer and the Making of Wheat" at Sydney University on 10th October, 1979.

The 1979 Scholar, Mr R. G. Flood, has continued with his studies leading towards the award of a Ph.D. degree.

SERVICES TO OTHER DEPARTMENTS AND ORGANIZATIONS

The Department provides a large range of services to other organizations. These services are too numerous to be listed individually. Following are examples indicative of the range of services provided.

Further assistance was given to the Australian Development Assistance Bureau in the conduct of feasibility studies on the provision of consultant services in Bangladesh, Indonesia, Middle East, Philippines, Sri Lanka and Thailand, and in the conduct of projects in Bangladesh, Seychelles and Sri Lanka.

Advice was given to the State Pollution Control Commission on the prevention of excessive noise in relation to devices used to protect fruit against flying foxes and birds and the risks of fluoride pollution to vineyards in the Hunter Valley as a result of smelter operations.

Technical advice on livestock matters was provided to properties administered by the State Departments of Education, Corrective Services, Police, Youth and Community Services, the Health Commission and the National Parks and Wildlife Service.

Chemical analytical services were provided to the University of Sydney (72), the Commonwealth Department of Primary Industry (12), Royal Prince Alfred Hospital (200), the Forestry Commission of N.S.W. (5), the National Association of Testing Authorities (4) and Fielders Gillespie Pty Ltd (10).

Land use assessments were provided for the Goverment of Saudi Arabia, Narrandera Shire Council, New South Wales Planning and Environment Commission, and the New South Wales Electricity Commission.

At the request of the Mines Department, 213 properties were inspected in respect of 72 applications to enter under the Mining Act, and reports were prepared in respect of 103 loan applications under the Farm Water Supplies Act for the Water Resources Commission.

Other advice and assistance provided included:

- to various State and Commonwealth Departments on statistics and computing;
- to various authorities in connection with Australian Plague Locusts;
- to the Department of Youth and Community Services in connection with flood and bushfire relief;
- to the Rural Assistance Board on tree pull compensation for deciduous fruit growers;
- to the Department of Local Government and councils on the administration of noxious plant plant control;
- to the Commonwealth Department of Aboriginal Affairs on the training of aborigines;
- to the Department of Public Works on the agricultural environment surrounding proposed public works;
- to the Coastal Protection Council in connection with the preparation of land use maps.

OVERSEAS CONFERENCES AND STUDY TOURS

Name and designation	Country	Purpose
G. R. Gregory, Chief, Division of Horticulture.	Denmark, Netherlands, Germany F.R., France, U.K.	Attend Joint Council/Executive meeting of International Society for Horticultural Science—investigate schemes concerned with plant improvement and with marketing of fresh fruit and vegetables.
R. Sweedman, Principal Horticulturist (Stone Fruits).	U.K., France, Yugoslavia, Romania, Bulgaria.	To study research developments in the production, processing and marketing of prunes.
J. F. Johnson, Principal Horticulturist (Pome Fruits).	Jammu-Kashmir, India.	Consultant for World Bank project on improving field production, harvesting, presentation and storage of apples.
J. D. Baker, District Horticulturist (Vegetables).	Canada, U.S.A. ..	Study mushroom production and attend first North American mushroom growers congress.
A. M. Grieve, Senior Research Horticulturist.	Israel, U.K., U.S.A.	Study irrigation management and salt tolerance in horticultural crops.
B. Freeman, Senior Research Horticulturist.	China	Citrus research, collect seeds of citrus related rootstocks.
K. J. Scott, Senior Research Scientist	New Zealand ..	Collaborative postharvest research on export apples.
R. J. Hutton, Research Horticulturist	U.S.A.	Research on high density fruit plantings, mechanical harvesting of citrus.
K. J. Scott, Senior Research Scientist	Philippines and Hong Kong.	Attend postharvest research conference, investigate treatments for export fruit.
D. J. Batten, Research Horticulturist	India, Taiwan ..	Collect tropical fruit varieties and study cultural methods.
Dr D. J. McDonald, Regional Director of Research.	Burma	Participated in Burma Seed Development Project sponsored by World Bank.
Dr D. J. McDonald, Regional Director of Research.	China	Member of Australian Plant Breeders and Geneticists Group under auspices of Australian Academy of Science.
Dr D. J. McDonald, Regional Director of Research.	Philippines ..	Attended International Symposium on Future Rice Strategies at 20th Anniversary Meeting of International Rice Research Institute.

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Name and designation	Country	Purpose
Dr D. G. Saville, Director of Research.	China	Member New South Wales delegation in assessing areas of possible joint co-operation and exchange with Guangdong Province.
L. J. Cook, Principal Agronomist (Seeds).	Europe	Australian delegate to the Annual and Advisory Group Meetings of the National Authorities Responsible for the Implementation of the DECD Certification Schemes for Seed Moving in Internation Trade. Triennial Congress of the International Seed Testing Association.
R. J. Fletcher, Research Agronomist (Wheat Breeding).	Japan, Canada, U.S.A., U.K., South Africa.	Awarded a Churchill Fellowship to study wheat breeding for frost resistance.
R. F. Komoll, Principal Agronomist (Winter Cereals).	Saudi Arabia ..	Australian Wheat Board Mission.
J. A. Thompson, Research Agronomist.	Egypt	International Conference on Irrigated Soybean Production in Arid and Semi-Arid Regions.
Dr N. G. Nair, Senior Research Scientist.	Kenya	Completion of a United Nations project which has enabled the Ministry of Commerce and Industry of the Government of Kenya to establish a mushroom spawn manufacturing unit.
P. Barkley, Senior Research Scientist	China	Study citrus culture and diseases.
Dr E. J. Cother, Research Scientist..	The Netherlands ..	Study potato diseases.
Dr E. V. Lassak, Senior Research Scientist.	France	Australian delegate to Working Group on Chromatography of the International Standards Association.
Dr B. V. McCleary, Research Scientist.	Switzerland ..	Post-Doctoral research in carbohydrate biochemistry.
Mr A. S. Awad, Senior Chemist ..	Saudi Arabia, Abu Dhabi, U.K.	Study new developments in hydroponics and utilization of saline waters for agriculture.
Mr R. H. Read, Senior Chemist ..	France, Tunisia ..	Consultant to World Bank Agro Pastoral Project in North Africa.
Mr R. H. Read, Senior Chemist ..	Saudi Arabia ..	Consultant to irrigated wheat project.
Mr G. J. Osborne, Senior Chemist ..	U.K.	Post-graduate studies in soil science.
Mr I. G. Ferris, Chemist	U.S.A.	Post-graduate studies in pesticide biochemistry.
H. C. Kirton, Deputy Chief Biometrician.	Brazil	Attend the tenth International Biometrics Conference.
G. A. C. Beattie, Entomologist ..	China	Study Citrus pests.
P. B. Hughes, Entomologist ..	U.K.	Post-graduate studies on insecticide resistance in sheep blowfly.
T. J. Korn, Technical Advisor (Noxious and External Animals).	U.K., U.S.A., France.	To study methods of vertebrate pest control.
G. J. Skillman, Director, Animal Quarantine.	Indonesia	Short term aid assignment relating to external animal quarantine controls.
G. C. Carter, Veterinary Officer, Quarantine.	Canada	Quarantine Supervision of first importation of horses by air from Canada.
D. Thompson, District Veterinary Officer.	U.S.A., Mexico ..	Special Assignment of Screw Worm Control.
J. Williams, Veterinary Officer ..	U.S.A.	Post-graduate studies in Epidemiology.
R. Weaver, Assistant Director, Animal Disease Control.	New Zealand ..	Diseases and Husbandry of Deer.
G. Frazer, Veterinary Research Officer.	Bangladesh ..	Departmental Aid Programme.
R. Webb, Senior Veterinary Officer	Bangladesh ..	Departmental Aid Programme.
D. Byrne A/District Veterinary Officer.	Seychelles ..	Supervision of Export of Australia Milking Zebu Cattle.
L. Valentine, District Veterinary Officer.	U.K.	Quarantine Supervision of Horse Importation.
Dr K. P. Sheridan, Assistant Director General.	China	Member New South Wales delegation in assessing areas of possible joint co-operation and exchange with Guangdong Province.
D. Fardy, Extension Research Officer	Thailand	To complete project on advice to Thailand Department of Agriculture on evaluation of their extension service.
J. Manwaring, Special Extension Officer (Marketing).	U.K., Holland, Canada, U.S.A.	Churchill Fellowship to study producer initiatives in marketing.
J. Davis, Senior Lecturer, Orange Agricultural College.	Belgium	International Symposium on Horticultural Economics.

STAFF STATISTICS

Departmental staff establishment as at 30th June, 1980

	Professional					General and Ministerial			Clerical[7]	Total
	Res.[1]	Ext.[2]	Educ.[3]	Admin.[4]	Total	Reg.[5]	Other[6]	Total		
Central Admin. ..	2	..	..	19	21	10	12	22	149	192
Extension Services	3	43	1	15	62	..	49	49	127	238
Animal Production	43	116	..	25	184	..	68	68	36	288
Animal Health ..	36	46	..	21	103	844*	569	1 413	149	1 665
Horticulture ..	29	34	..	16	79	138	9	147	25	251
Plant Industry ..	85	63	..	18	166	21	15	36	15	217
B. & C.R.I. ..	98	..	..	7	105	..	87	87	21	213
Biometrical ..	13	..	..	2	15	..	..	..	4	19
Mktg & Economics	28	..	..	10	38	..	18	18	12	68
Research Services	9	9	..	34	52	..	513	513	74	639
Ag. Education† ..	3	..	39	4	46	..	125	125	33	204
	349	311	40	171	871	1 013	1 465	2 478	645	3 994

* A.H., Reg., includes 305 Ministerial positions.

† Ag. Education includes 71 positions at Orange College.

[1] Professional officers whose time is predominantly occupied on research projects and laboratory diagnostic services.

[2] Professional officers whose time is predominantly occupied on extension to farmers.

[3] Professional officers whose time is predominantly occupied on agricultural education.

[4] Professional officers whose time is predominantly occupied on administrative or other activities.

[5] General Division and Ministerial staff whose time is predominantly occupied on regulatory activities.

[6] Other General Division and Ministerial staff (not including typists and clerical assistants).

[7] Clerical (including clerks, typists, stenographers, machine operators and clerical assistants).

Senior retirements, resignations and appointments

Retirements

H. P. Hall—Regional Director of Extension, Lismore.
J. R. Dains—Principal Livestock Officer (Pigs).
Dr K. J. Moore—Acting Director of Biology.
R. Godden—Regional Director of Extension, Gunnedah.

Resignations

Dr P. McInnes—Chief, Division of Animal Production.

Appointments

G. Mohr—Research Co-ordinator, Division of Research Services.
Dr R. L. Colman—Regional Director of Research, Orange.
H. Scott-Orr—Assistant Director, Brucellosis Eradication, Division of Animal Health.
K. Sawers—Principal Economist.
L. Henry—Economist.
D. Briggs—Economist.
Dr P. F. Kable—Acting Director of Biology.
J. D. Kelly—Executive Officer (Administration).
K. Fishpool—Regional Director of Extension, Orange.
B. Lenne—Principal Extension Officer (Programmes).

Transfer

E. Tindale—Regional Director of Extension, Lismore.

MARKETING BOARDS AND POLLS

The Division of Marketing and Economics is responsible for administration of the Marketing of Primary Products Act, 1927, and, in particular, for the appointment of members of the Boards established under the Act.

The 12 Marketing Boards in operation during the year were the Barley, Central Coast (N.S.W.) Citrus, Egg, Grain Sorghum, Lemon, Murray Valley (N.S.W.) Citrus, Oats, Oilseeds, Rice, Tobacco Leaf, Wine Grapes and Yellow Maize Marketing Boards. The Sheep Meats Marketing Board remained in recess.

Polls under the Marketing of Primary Products Act

By arrangement, and with the approval of the Minister for Agriculture, the State Electoral Office has, since late 1977, conducted all the triennial elections of representatives of producers to these Marketing Boards, with the Electoral Commissioner for New South Wales being the Returning Officer. The Division of Marketing and Economics has been the link between the Minister, the Electoral Office and the Boards and in all cases, the Division carried out most of the preparatory work involved in the holding of these polls.

Four polls were conducted under the Act by the Electoral Office in conjunction with the Division during 1979–80. These were—

(1) Triennial election of five producers' representatives to the Rice Marketing Board (25th September, 1979). The five sitting members were the only candidates and they were declared elected unopposed for a new three year term of office from 9th November, 1979.

(2) Triennial election of five producers' representatives to the Egg Marketing Board (2nd October, 1979). The election was contested in one electoral district and there were 346 voters. The three successful candidates and the other two members who were unopposed were declared elected for a new three year term of office from 16th November, 1979.

(3) Triennial election of five producers' representatives to the Grain Sorghum Marketing Board (29th April, 1980). When nominations closed there were eight candidates. In the resulting poll there were 1 645 voters and the five successful candidates were declared elected for a new three year term of office from 18th June, 1980.

(4) Triennial election of three producers' representatives to the Tobacco Leaf Marketing Board (19th June, 1980). When nominations closed in May the three sitting members were the only nominations and they were declared elected unopposed for a new three year term from 6th August, 1980.

DIVISIONAL ADMINISTRATION

Division of Animal Production

(*a*) *Functions*

The function of the Division of Animal Production is to acquire and disseminate information, and to provide other services for the benefit of livestock industries in New South Wales.

Although the Division is *technically orientated*, the acquisition and application of knowledge is undertaken in a scene which has economic and welfare implications. Furthermore, the livestock industry cannot be viewed in isolation as products and many other industries are dependent on its viability.

To undertake its function, the Division is organized on a commodity basis. Research and extension tend to be operated specifically for the sheep, beef cattle, dairy cattle, pig, poultry and apiculture industries. District livestock officers and livestock research officers perform these functions mainly for one commodity industry, and are located for this purpose in Extension and Research Regions. The major technical administration, and regulatory and service supervision is centralized at Head Office.

Regulatory responsibilities include administering Acts or policies concerned with identification of livestock, controlling declared noxious animals and pests, mitigating the effects of natural disasters, defining and controlling product quality, ensuring safety and compliance with labelling provisions of commercially prepared stock feeds, and developing codes for animal husbandry practices to allow hygienic production and welfare of livestock.

Services included classification of livestock carcases, dairy herd recording, fleece testing, production and performance testing in competitions and judging of livestock.

(*b*) *Significant Administrative Developments*

The Division of Animal Production commenced operations on 1st July, 1979, and was formed through the restructuring of the Divisions of Animal Industry and Dairying.

The Division of Animal Production was established with specific tasks to continue to improve production in the "healthy" animal. The Department's responsibility for the control of diseases is vested in the Division of Animal Health, yet, some managerial techniques to optimise production coincide with, or are complementary to, effective health programmes. Also, improving animal production relies on the undertakings of other departmental functions provided by Divisions such as those of Plant Industry and Marketing and Economics. The Division also relates to responsibilities administered by other government departments in New South Wales and in other State and Federal Departments concerned with livestock production and protection. In addition, the Division relies on institutions such as universities, colleges of advanced education and CSIRO to undertake duties effectively and to train personnel. Interaction with industry organizations and consultants occurs.

Division of Plant Industry

(*a*) *Functions*

The functions of the Division of Plant Industry are mainly in the broad fields of agronomic research and extension. The Division also administers the Agricultural Seeds Act, for which it has a small regulatory staff and a seeds laboratory.

The Division is responsible for research and extension within the whole range of field crops and pastures, fodder conservation, seed production, weed control, irrigation, and remote sensing. Its research covers breeding, physiology, ecology and nutrition of crops and pastures and the ecology of weeds. It covers the development of new crops and of new practices such as reduced tillage.

The Prickly-pear Destruction Commission, which functions within the administration of the Division, presents a separate report to Parliament (see Annexe).

Division of Horticulture

(*a*) *Functions*

The Division of Horticulture is concerned with prevention and control of plant pests and diseases and the production, marketing and export of fruit, vegetables and ornamentals. This Division's research, extension and regulatory services are largely designed to assist those industries involved in the growing, postharvest handling and processing of fruit, vegetable and ornamental crops. However, in respect to the administration of plant quarantine the full range of agricultural pests and diseases are covered and with inspections and certification of exports the Division's responsibilities embrace commodities such as grain as well as horticultural products.

Research: Research horticulturists are located at research stations and laboratories on the north coast, central coast, northern tablelands, central tablelands and in the County of Cumberland as well as in the central west, Murrumbidgee and Lower Murray irrigation areas. A comprehensive research programme relating to plant improvement, establishment/management, production/harvesting, storage/disinfestation/product quality and economics is being conducted with respect to fruit, vegetables and, to lesser degree, ornamental crops.

Extension: Extension horticulturists are located in the major fruit and vegetable production areas of the State with the object of assisting primary producers to obtain the maximum benefit from their resources by adopting improved techniques. Extension horticulturists are the link between research and commercial practices. They also assist in the prevention and control of plant pests and diseases as well as being responsible for the presentation of statistical information and crop forecasts. A Gardens Advisory Service also operates.

Regulatory: Inspectors (Plant Diseases Act) enforce legislation concerned with the prevention and control of plant pests and diseases; the grading, packaging and labelling of fresh fruits/vegetables; the licensing of potato growers, nurserymen and resellers of nursery stock; and maintaining fruit/vegetable quality standards. As agents for the Commonwealth Government the Export and Import Branch of this Division administers the plant quarantine provisions of the Quarantine Act and regulations relating to the export of fresh fruit, vegetables, plants, seeds, flour, wheat and other grains under the Commerce (Trade Descriptions) Act.

(*b*) *Significant Administrative Developments*

The Division of Horticulture accepted responsibility for floriculture extension and a training programme was initiated with the co-operation of industry representatives to assist in providing a service initially for cut flower growers.

The Home Garden Inquiry Service was transferred to the Division of Horticulture on 1st July, 1979, and renamed Gardens Advisory Service. The three gardens advisory officers presented 15 lectures to garden clubs, horticultural societies and Agricultural Bureaux and visited gardens and nurseries in the Sydney Metropolitan Area. They also revised some existing publications and prepared material for new Departmental bulletins. Service to the public was improved by increasing the number of telephone lines from three to six. Total inquiries increased from 17 989 in 1978–9 to 29 347 in 1979–80.

Division of Animal Health

(*a*) *Functions*

In previous years the functions of animal health and production were united in a single Division of Animal Industry. The Division of Animal Health is responsible for research, extension and regulatory control of livestock health.

Research is conducted into diseases of all classes of commercial livestock and is principally of an applied nature, related to health problems identified by veterinary field officers.

Extension is directed at educating stockowners to improve the health of commercial livestock and to ensure adherence to regulatory disease control measures.

Regulatory control is exercised over scheduled diseases and pests of livestock. The Division is responsible for inspection of meat for local consumption; and the registration of stock medicines. On behalf of the Australian Government, the Division administers the sections of the Quarantine Act relating to the import and export of animals and the import of animal products.

The infectious nature of most significant diseases combined with the mobility of livestock requires a high degree of central co-ordination of policy formulation and operation control.

The Division of Animal Health operates a budget of $34.5 million (37 per cent of Department vote) under the Chief Veterinary Officer, through eleven strategically placed district veterinary officers, 20 veterinary officers, and over 1 000 lay inspectors in co-operation with 40 veterinary inspectors who are employed by the Pastures Protection Boards to supply veterinary service to the rate payers of the Pastures Protection Districts and, with veterinary practitioners, is a valuable extension of Departmental activity.

(*b*) *Significant Administrative Developments*

The Division of Animal Health commenced operation on the 1st July, 1979, and was formed through the restructuring of the Divisions of Animal Industry and Dairying.

Division of Research Services

(*a*) *Functions*

The Division of Research Services fulfils the following functions:

- Administration and co-ordination of research.
- Research station management.
- Architectural services.
- Agricultural engineering services.

Administration and co-ordination of research: The Division of Research Services provides the framework within which the Department's regional research services are conducted. This involves:

- Administration of regional research centres and stations, research support staff, research finance from all sources and capital works and buildings and property maintenance programmes.
- Research co-ordination across Divisions including the administration of industry research grants ($1.7 m for 165 projects) and liaison with other organizations.
- Development and direction of regional research programmes by five regional directors of research centred at Wollongbar, Tamworth, Orange, Wagga and Yanco.
- Personal research programmes are conducted by the five regional directors of research, the Director of Research, Trangie and agricultural engineers at Glenfield and Condobolin.

Research station management: Research station management is conducted by managers at 19 regional research centres and stations and at the Veterinary Research Station, Glenfield. The managers control staff and finance and plan and develop the physical environment, facilities, and property and stock management strategies for the promotion of agricultural research programmes.

Architectural services: The Architect's Section comprises an architect and technical support staff responsible for the design and supervision of construction of research facilities in the Department's building and maintenance programmes and service installations. As well, it liaises with the Department of Public Works and the Housing Commission; and provides plans and building advice to other authorities and to farmers.

Agricultural engineering services: The functions of the Agricultural Engineering Section include:

- Regionalized farm mechanization extension by nine agricultural mechanization officers to advise farmers on the characteristics, use and maintenance of power units and agricultural machinery and on the development of farm mechanization systems.
- Research, development and extension support by seven agricultural engineers at Glenfield and Condobolin to develop prototype farm machinery and farm mechanization systems; to investigate soil and machinery interactions and energy relationships, as well as the production and use of alternative liquid fuels on farms; to design and construct equipment and machinery for specific Departmental research projects.
- Engineering technical services by four technical officers who also advise and assist Departmental officers with respect to the purchase and disposal of scientific instruments, farm machinery and motor vehicles. Services include the design and construction of sophisticated controlled environment facilities for research, as well as the management of the Department's motor vehicles fleet of over 1 000 vehicles.

(*b*) *Significant Administrative Developments*

- During the year, 246 staff positions comprising outdoor support staff and domestic employees at research centres and stations, previously established under Ministerial authority, were approved as Public Service Board positions.
- The Division's appropriation from the Consolidated Revenue Fund ($8,592,805) was divided into regional components for operating funds.

Division of Extension Services

(*a*) *Functions*

- Directs and co-ordinates the Department's extension services throughout the State's eight agricultural regions.
- Administers and maintains the Department's regional offices.
- Supports staff with extension methods training and the provision of audio visual aids.
- Provides the publication and information services of the Department. These include editorial services and press liaison.
- Promotes group extension activities and provides organizational help to the Agricultural Bureau of New South Wales.
- Conducts extension/research evaluation.
- Initiates extension research liaison.
- Administers and provides professional staff for the Rural Youth Organization.
- Administers the Department's library services.
- Administers the certificate colleges (Yanco Agricultural College and C. B. Alexander Agricultural College).

(*b*) *Significant Administrative Developments*

The 7 regional extension officer positions were deleted from the staff establishment and eight positions of assistant regional director of extension created.

Divisional administrative structure at Head Office was re-organized with the creation of two senior administrative positions at Grades 5 and 7/8.

The Agricultural Education Secretariat was disbanded during the re-organization.

The 50 per cent reduction in the 1979–80 Commonwealth Extension Services Grant necessitated a substantial review of the New South Wales Programme. Forty-seven positions were transferred to State funds as from 1st July, 1979, leaving 41 positions paid by the grant. Generally, professional positions were transferred with additional State funds being allocated to meet associated operating costs. Significant changes were made in allocation of funds, with post-graduate training and "Other Agencies Portion" being deleted.

The continuing development and build-up of regional resources and financial delegations was supported with the rise in status of regional directors of extension to that of deputy chief. The increase in regional responsibility was recognized by the creation of positions of assistant regional directors of extension to replace the regional extension officers.

A Marketing Unit was created with the appointment of two extension officers (marketing) who will work with the Special Extension Officer (Marketing). The unit will concentrate on identifying market opportunities for agricultural produce in East and South East Asia and will be closely associated with the New South Wales Overseas Trade Authority and the Commonwealth Department of Trade.

New appointments in the Division include a public relations officer who will aim at improving the Department's contact in the metropolitan areas and an extension officer to handle the Rural Youth correspondence courses.

Division of Marketing and Economics

(*a*) *Functions*

The Division of Marketing and Economics is responsible for the provision of economic intelligence and for undertaking economic analysis of policy issues relevant to the New South Wales agricultural economy. The Division undertakes research on all aspects of the production, marketing and handling of New South Wales agricultural products; develops research and extension methodology in agricultural economics and farm business management; provides advice on commodity prospects, marketing schemes and rural policy generally; provides extension services in agricultural economics and farm management.

The Division publishes one professional journal, the *Review of Marketing and Agricultural Economics*; a monthly *Commodity Bulletin*; two bulletin series, one on farm management and the other on research studies undertaken within the Division. Six regional economic bulletin series are published to provide farmers and extension workers with farm management and agricultural economics data relevant to particular regions.

A comprehensive price reporting service is provided for all major livestock markets and all produce markets in the Sydney Metropolitan Area. In addition a retail price reporting service operates for meat, fruit and vegetables, and certain other commodities. Market outlook and commodity information for a number of products are distributed to the media, producers, processors and other Government authorities.

The Division administers the Marketing of Primary Products Act, 1927, under which 12 primary produce marketing boards are constituted. Officers of the Division are representatives on these State boards as well as Commonwealth boards and committees. Submissions on rural industry matters are prepared and presented to the Industries Assistance Commission, the Prices Justification Tribunal and other Government inquiries.

(*b*) *Significant Administrative Developments*

The livestock Market Reporting Service continued to expand, with the appointment of two part-time officers, at Moree and Goulburn. Additional facsimile machines were acquired to enable quicker dissemination of market reports, and approvals were obtained to install automatic telephone answering equipment in the major country centres. Computerization of the Service is proceeding.

Approval was obtained to fill the position of Special Economist (Projects) to undertake monitoring and management auditing functions in respect of MPP Act boards and various statutory authorities concerned with primary products in New South Wales.

Biological and Chemical Research Institute

(*a*) *Functions*

The Institute consists of three scientific branches—Biology, Chemistry and Entomology—and a Sectetariat which provides managerial and clerical support.

The Biology Branch consists of plant pathologists and legume bacteriologists. Plant pathologists carry out research on diseases of plants, diagnose plant diseases and advise officers of other Divisions and primary producers on plant disease control. They advise State and Commonwealth authorities on matters relating to plant quarantine. The Electron Microscope Unit also acts as a service unit to other Branches and Divisions of the Department.

Legume bacteriologists carry out research on factors influencing the successful establishment of nodule producing bacteria in the soil and on the plant and on ways of improving nitrogen fixation in grain legumes. They distribute cultures of those bacteria to other research centres and industrial organizations. They advise field officers of the Department and primary producers on the most efficient methods of legume inoculation. The Australian Inoculant Research and Control Service operates a quality control service for commercial legume inoculants available throughout Australia to ensure the maintenance of high nitrogen fixing ability.

The Chemistry Branch is responsible for conducting research, providing analytical services and giving technical advice on chemical aspects of plant and animal production and related industries in New South Wales. The branch is organized into five Sections dealing with the specialized areas of analytical chemistry; plant and cereal chemistry; pesticide chemistry; soil fertility and plant nutrition; and soil morphology and land use assessment.

Each of these specialist groups conducts research into problems facing agriculture in New South Wales and, at the same time, provides recommendations and analytical information to the Department's extension officers who advise farmers on their day-to-day problems. Some of these sections have the added responsibility of seeing that products such as pesticides, stockfeeds and medicines, fertilizers and cereals are of proper standard and are safe for both the farmer and the consumer.

(*b*) *Significant Administrative Developments*

The Essential Oils Group, which constituted the Department of Chemistry in the Museum of Applied Arts and Sciences, was transferred to the Chemistry Branch, Department of Agriculture in November. The group, which consists of two research scientists and two technical officers, now constitutes a unit within the Plant and Cereal Chemistry Section. The unit will continue its work on essential oils and will broaden its interests to include research and analytical services in phytochemistry as related to agriculture in New South Wales.

Dr I. G. Ferris, chemist, has been transferred from the Central Laboratory, Rydalmere, to the Agricultural Research Centre, Tamworth. At Tamworth he has joined a multi-disciplinary team studying minimum tillage systems for wheat. Dr Ferris will be studying the fate of herbicides and other pesticides used in minimum tillage systems.

Mr H. G. Willats, chemist, has been transferred from the Veterinary Research Station, Glenfield, to the Central Laboratory, Rydalmere, where he has joined the Analytical Chemistry Section. This transfer will strengthen the section's activity in the areas of methods development and quality control.

Several rooms within the Central Laboratory, Rydalmere have been refurbished. These rooms provide new facilities for the chromatography of pesticides, and the preparation and analysis of soils, plants, fertilizers and waters.

Biometrical Branch

(*a*) *Functions*

The Biometrical Branch is responsible for the statistical and mathematical aspects of the Department's research activities. The staff of the Branch consult with research staff at all research stations, advise on proposed plans and methods of analysis and critically examine research projects. They also give seminars and training courses on advances in biometry and computing and carry out biometrical research.

Consultation between biometrician and research worker leads to co-operative research projects in which the biometrician does the statistical part and assists in preparing the results for publications.

The Branch is also responsible for scientific computing and the staff prepare programmes and advise on their use.

APPENDIX I

FINANCIAL SUMMARY, 1979–80

DEPARTMENTAL

The Department of Agriculture's day-to-day running costs are met from Consolidated Revenue Fund. Receipts from the administration of various Acts of Parliament, as well as contributions from the Commonwealth towards certain specified functions, are paid into the Consolidated Revenue Fund. Expenditure during 1979–80 by the Department totalled $57,798,287 from Consolidated Revenue Fund while revenue amounted to $14,076,152. The expenditure of $57,798,287 financed, among other things, such functions as:

Cattle Tick Control—$7,158,311.

Maintenance—Agricultural Colleges—$2,570,576.

Biological and Chemical Research—$3,369,597.

Maintenance of Various Research Stations—$8,693,793.

EXTENSION AND APPLIED RESEARCH

Apart from finance from Consolidated Revenue, the Commonwealth Government provides a special grant known as the Commonwealth Extension Services Grant. Expenditure from this source amounted to $1,468,512 during 1979–80 and was devoted entirely to extension and applied research.

OTHER RESEARCH FINANCE

Funds provided by industry, semi-government bodies and special Commonwealth Government grants are utilized in many research programmes and projects conducted by the Department of Agriculture. The Department relies heavily on this finance for research work and these sources provided $1,940,902 in 1979–80. Expenditure for the year amounted to $1,696,695.

CAPITAL WORKS PROGRAMMES

Funds for various capital works programmes are provided from General Loan Account and Commonwealth Government grants under the Advanced Education Acts. General Loan is financed by the State of New South Wales, while Advanced Education is financed by the Commonwealth.

Expenditure in 1979–80 on capital works was $2,571,617 made up of $2,500,000 from General Loan and $71,617 from Advanced Education Funds.

ACCOUNTS OF DEPARTMENT OF AGRICULTURE FOR THE YEAR 1979–80

The cost of maintaining the Department of Agriculture is met from the Consolidated Revenue Fund, whilst capital expenditure on buildings, equipment and permanent improvements to departmentally owned property is a charge on the General Loan Account.

In addition to these sources of funds, the Department is assisted in financing certain lines of research and development, together with the control of insect pests and animal diseases, by levies on industry and by grants from the Commonwealth, semi-government and public and private organizations. Operations in this category are reflected in a large number of accounts within the classification of "Special Deposits" Accounts. The operations on some of the more significant Special Deposits Accounts are detailed later.

COMPARATIVE STATEMENT OF EXPENDITURE

Account	1978–9	1979–80	Variation
	$	$	$
Consolidated Revenue Fund	53,012,663	57,798,287	4,785,624 (+)
General Loan Account	2,300,000	2,500,000	200,000 (+)
Special Deposits Accounts	26,640,351	31,591,529	4,951,178 (+)
	81,953,014	91,889,816	9,936,802 (+)

CONSOLIDATED REVENUE FUND EXPENDITURE

Following are details of expenditure from Consolidated Revenue Fund for the previous two years:

Division	1978–9	1979–80	Variation
	$	$	$
Central Administration	9,187,436	8,296,261	891,175 (−)
Biological and Chemical Research Institute	2,787,142	3,369,597	582,455 (+)
Plant Industry	3,949,130	4,592,410	643,280 (+)
Horticulture	3,688,529	4,429,013	740,484 (+)
Research Services	7,023,548	8,693,793	1,670,245 (+)
Agricultural Colleges	2,232,722	2,570,576	337,854 (+)
Animal Health and Production*	15,562,328	18,688,326‡	3,125,998 (+)
Cattle Tick Control†	6,459,229	7,158,311	699,082 (+)
Royal Botanic Gardens	2,122,600	....§	2,122,600 (−)§
	53,012,664	57,798,287	4,785,623 (+)

* Includes former Divisions of Dairying and Animal Industry—Head and District Offices.

† Includes former Division of Animal Industry—Queensland Border and Tick Quarantine Areas.

‡ Includes State contribution to National Bovine Tuberculosis and Brucellosis Eradication Campaign of $3,267,333. This amount was transferred to Special Deposits Account, details of which are given later in this report.

§ Royal Botanic Gardens has been transferred to the control of the Premier's Department.

GENERAL LOAN EXPENDITURE 1979–80

	$
Condobolin Agricultural Research Station—	
Glass House	1,776
Cowra Agricultural Research Station—	
Laboratory/Administration Building	3,476
Glenfield Veterinary Research Station—	
Laboratory Extensions	5,000
Orange Agricultural Research Station—	
Glasshouse	42,271
Laboratory/Administration Building	2,122,083
Property Purchase	82,021
Rydalmere Biological and Chemical Research Institute—	
Electron Microscope Building	475
Insecticide Resistance Laboratory	5,611
Mushroom Growth Room	2,298
Workshop	1,800
Tamworth Agricultural Research Station—	
Laboratory Extensions	6,239
Wagga Agricultural Research Institute—	
Extensions to Laboratory	17,895
Yanco Agricultural Research Centre—	
Glasshouse	1,200
Plant and Equipment—	
Purchases for whole of the Department	197,239
Road Construction or Renewal for the whole Department	10,616
	2,500,000

SPECIAL DEPOSITS ACCOUNT

Transactions on some of the more significant Special Deposits Accounts during 1979–80 are given below:

COMMONWEALTH GRANTS FOR STATE SECONDARY SCHOOLS—TECHNICAL TRAINING PROJECTS

These funds are made available by the Commonwealth under the States Grants (Technical Training) Acts. Works under the first triennium (1st July, 1965, to 30th June, 1968) were completed at a total cost of $800,000 and works under the second triennium (1st July, 1968, to 30th June, 1971) were completed at a total cost of $1,227,000. Works under the third triennium (1st July, 1971, to 30th June, 1974) have been completed, $2,582,811 has been spent to 30th June, 1980, and final payments will be made in 1980–81.

A summary of receipt and expenditure of funds under the third triennium is shown hereunder:

	$	$
Grant received from Commonwealth (including supplementation)		2,590,000
Expenditure to 30th June, 1979	2,582,811	
Expenditure 1979–80	Nil	2,582,811
Balance of funds available to complete third triennium		7,189

COMMONWEALTH GRANT FOR COLLEGES OF ADVANCED EDUCATION

Commonwealth legislation provides for grants towards State expenditure on advanced education for courses of instruction which comply with the conditions laid down in the Commonwealth Acts. Until 31st December, 1973, grants were made for the following two purposes:

(1) Financing of major capital projects on a $1 for $1 basis by Commonwealth and State.

(2) Recurrent Expenditure (running costs). The Commonwealth contributed $1 for every $2.85 spent by the State.

Commencing on 1st January, 1974, colleges of advanced education have been wholly financed by the Commonwealth Government, there being no further contributions by the State as set out in (1) and (2) above. However, the State was required to contribute 1/6th of the 1973–5 triennium Capital Works Programme.

Expenditure on the advanced education programmes is summarized as follows:

	$	$
Major Capital Projects—		
First Triennium 1st January, 1967, to 31st December, 1969— *Total* Expenditure First Triennium		800,930
Second Triennium 1st January, 1970, to 31st December, 1972— *Total* Expenditure Second Triennium		4,418,471
Third Triennium 1st January, 1973, to 31st December, 1975— *Total* Expenditure Third Triennium		4,557,603
Annual Allocation—1976— *Total* Expenditure		49,607
Annual Allocation—1977— *Total* Expenditure		29,342
Annual Allocation—1978— *Total* Expenditure		21,841
Annual Allocation—1979— Expenditure to 30th June, 1979	8,724	
Expenditure 1979–80—		
Orange Agricultural College—		
Office/Printery	24,583	
Carpenter's Workshop	13,416	
Purchase of Equipment	16,451	
		63,174
Total Expenditure to 30th June, 1980		$9,940,968

AUSTRALIAN DEVELOPMENT ASSISTANCE BUREAU WORKING ACCOUNT

The finance for Australian Development Assistance Bureau projects is provided by the Bureau. In addition to providing technical expertise and advice, the projects in various countries are managed by Departmental personnel. Details of the operations of the Special Deposits Account for the assistance are given below for the year ending 30th June, 1980.

		$
Balance as at 1st July, 1979		447,609
Receipts during the year		1,555,157
		$2,002,766
Less:		
Expenditure—	$	
Salary and Allowances	543,650	
Travelling Expenses	68,174	
Materials and Equipment	615,341	
Other Expenses	69,525	
Overhead Expenses	63,790	
Advances	91,824	
		1,452,304
Balance at 30th June, 1980		$550,462

SWINE COMPENSATION FUND

Following is a summary of operations on the Swine Compensation Fund for year ending 30th June, 1980:

		$
Balance in fund at 1st July, 1979		1,264,263
Receipts—Interest		109,150
		1,373,413
Payments—	$	
Compensation	739	
Administration Costs	5,719	
Research Costs	8,453	
		14,911
Balance at 30th June, 1980		$1,358,502

CATTLE COMPENSATION PAYMENTS 1979–80

	Numbers of claims				Numbers of animals				Payment details			
	Reg. 5	Reg. 6	Section 5 (1) E	Total	Reg. 5	Reg. 6	Section 5 (1) E	Total	Reg. 5	Reg. 6	Section 5 (1) E	Total
									$	$	$	$
Brucellosis ..	4 053	2	5	4 060	14 541	2	6	14 549	1,232,848	295	150	1,233,293
Tuberculosis ..	44	6	..	50	242	21	..	263	23,460	2,120	..	25,580
Johnes Disease ..	..	8	..	8	..	11	..	11	..	2,529	..	2,529
Totals ..	4 097	16	5	4 118	14 783	34	6	14 823	1,256,308	4,944	150	1,261,402

CATTLE COMPENSATION FUND

	$	$
Balance as at 1st July, 1979		3,504,253
Receipts—		
Interest	222,000	
Levies	1,553	
Stamp Duty	207,392	
Commonwealth Contributions—Tuberculosis Reactors	13,302	
Commonwealth Contributions—Brucellosis Campaign	921,251	
		1,365,498
		4,869,751
Payments—		
Compensations—		
National Brucellosis	1,232,848	
National Tuberculosis	23,460	
State Brucellosis	445	
State Tuberculosis	2,120	
State—Other Diseases	2,529	
	1,261,402	
Administration Costs of Department of Agriculture	87,713	
Payable to Secretaries of Pastures Protection Boards	27,570	
Payable to Independent Valuers	90	
Transfer to Noxious Insects Destruction Fund*	19,451	
		1,396,226
Balance in fund at 30th June, 1980		$3,473,525

* This transfer arises due to incorrect allocation of the amount $19,451 for levies being brought into the statement for year ending 30th June, 1979.

ERADICATION OF BOVINE TUBERCULOSIS AND BRUCELLOSIS—WORKING ACCOUNT

		$	$
Balance in fund at 1st July, 1979			1,039,446
Income—			
Contributions by New South Wales			3,267,333
Fees for Services Rendered—N.S.W.			151
Contributions by Commonwealth			6,711,187
Fees for Services Rendered—Commonwealth			339
			11,018,456
Expenditure—			
Salaries, wages and associated charges		6,110,369	
Travelling expenses		137,322	
Vehicle running costs		434,096	
Printing and requisitions		27,594	
Postage and telephone		184,080	
Freight and cartage		88,057	
Equipment and materials		773,512	
Costs of cattle tags		157,527	
Maintenance, rentals, advertising and sundries			234,767
	$		
Payments to private practitioners for tuberculosis	817		
For Brucellosis sampling	329,636		
		330,456	
Administration costs		229,104	
Purchase of plant and motor vehicles		717,114	
Land, building and improvements		276,386	
			9,700,384
Balance as at 30th June, 1980			$1,318,072

Against the balance of $1,318,072 quoted above, must be considered firm commitments of $147,530 for capital items and $618,336 for other items, in total $765,866 leaving an actual credit balance of $552,206.

COMMONWEALTH EXTENSION SERVICES GRANT

Name of Item or Project	Expenditure 1978–9	Expenditure 1979–80
	$	$
Regional/Development Research	1,000,775	857,511
Market and Marketing Information	51,321	49,829
Information Services	483,650	336,247
Farm Financial Management	88,172	51,347
Farm Organization and Operations Management	586,419	131,936
Staff Training and Development	101,428	36,412
Evaluation of Extension and Applied Research	11,125	230
Other Organizations	40,649	5,000
	$2,363,539	$1,468,512

AUSTRALIAN INNOCULANTS RESEARCH AND CONTROL SERVICE—WORKING ACCOUNT

Following is a statement of receipts and payments for the above account for the year ended 30th June, 1980:

	$	$
Balance at 1st July, 1979		43,735
Receipts—		
Contributions from—		
New South Wales	14,800	
Queensland	6,000	
South Australia	4,800	
Tasmania	800	
Victoria	5,200	
Western Australia	8,400	
		40,000
		83,735
Payments—		
Salaries	38,459	
Operating Expenses	7,348	
		45,807
Balance as at 30th June, 1980		$37,928

NOXIOUS INSECTS DESTRUCTION ACCOUNT

The Noxious Insects Act provides for the striking and collection of a levy under specified conditions. Moneys received from the levy are paid into a Special Deposits Account and applied by the Minister for purposes of the Act. Following is a financial statement of the operations of this account during 1979–80 which included costs associated with plague locust as well as spur throated locust.

	$	$
Balance at 1st July, 1979		807,085
Receipts—		
Repayable advance from N.S.W. State Treasury	1,200,000	
Levies	667,075	
Sale of Assets	2,885	
		1,869,960
		2,677,045
Payments—		
Contribution to Australian Plague Locust Commission	279,692	
Equipment purchases	13,767	
Helicopter and Aircraft Hire	94,802	
Insecticide purchases	2,030,886	
Maintenance/Repair of equipment	7,486	
Materials and Sundry purchases including cyclone fencing	3,154	
Motor Vehicle purchases	15,053	
Motor Vehicle running costs	16,390	
Salaries	47,127	
Travelling expenses	19,228	
Postal and Telex and sundry expenses	6,994	
		2,534,579
Balance at 30th June, 1980		$142,466

Repayable advances from the Treasury are—
$250,000 made in 1976–7.
$500,000 made in 1978–9.
$1,200,000 made in 1979–80.

VETERINARY SURGEONS ACT

This Act provides for the establishment of a Board of Veterinary Surgeons for New South Wales. Fees and penalties collected are paid to the credit of Consolidated Revenue Fund from which the administrative expenses of the Boards are met.

Below is a Statement of Receipts and Payments for the year ended 30th June, 1980.

Receipts	$	$	Payments	$	$
			Administration—		
Application Fees		10	Advertising	544	
Complaint Fees	240		Legal Fees	100	
Less Refunds	160		Members Fees	1,232	
		80	Postage and Miscellaneous	1,708	
Registration Fees		2,390	Printing and Stationery	5,144	
Restoration Fees		415	Salaries	28,268	
Roll Fees		40,241	Travelling Expense	954	
					37,950
			Investigating Committee—		
			Members Fees	896	
			Members Travelling	1,087	
					1,983
			Excess receipts over payments		3,203
		$43,136			$43,136

MEAT INSPECTION SERVICE

The Meat Inspection Service is administrated by virtue of the Meat Industry Act, which makes provision for a scale of fees. Following is a statement of receipts and costs associated with this Service for the year ended 30th June, 1980.

	$	$
Receipts from inspection fees		7,483,206
Less—		
Salaries, wages and associated items	5,394,849	
Travelling expenses and vehicle running costs	424,740	
General stores, freight and cartage	50,595	
Books, periodicals and printing	14	
Rent, cleaning, electricity, phone and postages	10,300	
Laundry expenses	18,144	
Sundry expenses	452	
		5,899,094
Net gain on Meat Inspection Service		$1,584,112*

* Overhead expenses of $978,251 to cover administration charges, workers' compensation insurance premium payroll tax and employers' contribution to superannuation funds not charged direct should also be taken into account. The overall net gain on the Meat Inspection Service is then $605,861.

FUND CREATED BY WHEAT MARKETING (BARRING OF CLAIMS) ACT

Revenue Account for year ended 30th June, 1980

	$	$
Interest on Investments and Savings Bank Interest	6,676	
		6,676
Transfer of un-utilized revenue to Accumulated Funds	17	
Commitments entered into during the year	6,657	
Miscellaneous charges	2	
		6,676

Balance Sheet at 30th June, 1980

Liabilities	$	$	Assets	$
Accumulated Fund—			Investments in Government Securities (face value)	109,800
Balance 1st July, 1979	111,014		Commonwealth Bank Savings	252
Un-utilized revenue at 30th June, 1980	17		Accrued Interest	1,512
		111,031		
Commitments at 30th June, 1980		533		
		$111,564		$111,564

STATEMENT OF RECEIPTS—CONSOLIDATED REVENUE FUND

Year ended 30th June, 1980

	$
Receipts for Services Rendered—	
Rents	106,318
Student Fees	326,241
Fees—	
Public Officers	612
Apiary Registrations	21,571
Dairy Industry Act	469
Farm Produce Agents	484
Fertilizers Act	5,700
Pest Destroyers Act	94,809
Poultry Processing Act	20,600
Stock Brands Registration	22,056
Stock Foods and Medicines Act	32,570
Swine Brand Registrations	1,921
Veterinary Surgeons Act	43,136
Contribution from Commonwealth—	
for administration of plant quarantine	1,658,000
for administration animal quarantine	421,000
for administration of Commerce Act	341,474
for export certification of livestock	85,329
from CSIRO for cotton research	94,528
from Apprentices full-time training scheme	882

	$
Fees—	
Dipping	31,263
Inspection—Plant Diseases Act	27,646
Inspection—Meat Industry Act	7,483,206
Herd Recording	338,144
Seed Certification and Testing	39,206
Miscellaneous	272,067
Administration Costs—Cattle Compensation Fund	87,713
Administration Costs—Swine Compensation Fund	5,225
Commission on premium, collected	29,473
Miscellaneous receipts for services rendered	551,032
Total receipts for services rendered	12,142,675
General Miscellaneous Receipts—	
Fines and Forfeitures (including bond liability)	21,959
Interest	714
Sale of Farm Produce	1,052,450
Sale of Government Property	99,312
Repayments to credit of previous years votes	247,984
Transfer of part balances of Special Deposits Accounts no longer required	566
Miscellaneous Unclassified Receipts	10,019
Pastures Protection Boards 3 per cent Contribution	176,627
Employers liability to State Superannuation Fund	314,903
Sale of Publications	8,942
Total Miscellaneous Receipts	1,933,476
Grand Total—all receipts	$14,076,151

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APPENDIX II

PUBLICATIONS 1979–80

Publications are classified as: Those published by the New South Wales Department of Agriculture (including the *Agricultural Gazette of New South Wales*, *Review of Marketing and Economics*, *Dairy Topics*, *Poultry Notes* and bulletins); contributions to scientific journals; papers presented to technical conferences for which there is some kind of published record; these presented for higher degrees; books, and chapters in books; and miscellaneous articles such as those appearing in industry journals.

The appendix does not include many items published as news and information for press, radio and television, newspaper supplements or other material that can be regarded as largely ephemeral.

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"NBRS News". 1/79, 2/79, 3/79, 4/79, 5/79, 6/79, 1/80, 2/80.
"Objective measurement in the showring". AGBU 79/6.
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ANNEXE

REPORT OF THE PRICKLY-PEAR DESTRUCTION COMMISSION FOR THE YEAR ENDED 30th JUNE, 1980

The Hon. J. R. Hallam, M.L.C.,

Minister for Agriculture.

Sir,

I submit the report of the Prickly-pear Destruction Commission for the year ended 30th June, 1980.

The Commission is responsible for the eradication and control of prickly-pear throughout New South Wales and all phases of the Commission's activities were continued during the year. The provisions of the Prickly-pear Act, 1924, were enforced and satisfactory results were achieved. Co-operation and good relationships were maintained with government departments, shire and municipal councils, pastures protection boards, trusts, private organizations and individual land owners.

The objective of the Commission is complete eradication of prickly-pear from the State. However, this objective is not likely to be achieved due to the nature of the plant and the economics of such a plan. Complete eradication of prickly-pear is almost impossible because it is a very tenacious plant, which grows and thrives under practically any climatic conditions and is not affected by adverse seasonal conditions. Prickly-pear spreads and grows from seeds and parts of plants and large areas of rough country are infested. The seeds remain viable in the ground for at least thirty (30) years.

The role of the Commission is a police-type action. There are about 8 500 properties infested with prickly-pear in the State. All properties are inspected regularly and owners are obliged to take action to control prickly-pear infesting their lands.

The Commission relies on spraying prickly-pear with chemicals and biological control to keep it in check. Due to high labour and chemical costs, spraying prickly-pear has become very expensive, which has made it necessary to place much more reliance on biological control methods. Since 1975 the cost to spray prickly-pear has increased from about $90 per week for a man plus chemicals to over $300 per week. Many landholders cannot afford the high costs involved in spraying.

Biological control of prickly-pear with the insects cactoblastis and cochineal has never been very successful in some regions. This is due mainly to climatic conditions. An effort is being made to increase the effectiveness of the insects in these regions. Two scientific officers, who are based at the Agricultural Research Centre at Tamworth, are continuing with investigations into biological control of prickly-pear. Particular attention is being given to control of tiger pear with cochineal insects. Tiger pear is the main problem confronting the Commission.

The Commission has continued to make supplies of prickly-pear insects available to landowners free of cost. The insects are liberated and spread on properties where considered warranted. Excellent results are being achieved in regions where climatic conditions are favourable for the insects to work. Particularly where landowners co-operate by assisting the insects to breed and spread. Cochineal insects must be systematically hand spread at frequent intervals during the warm months to be successful.

The Commission continued to assist landholders, government departments, shire councils, pastures protection boards, trustees of commons, cemeteries, parks and reserves to destroy prickly-pear on lands under their control. Gangs of men are available for hire from the Commission to carry out prickly-pear eradication work. Much of this work is subsidized by the Commission on a dollar for dollar basis. A prickly-pear spray is supplied at cost price and when it is being purchased to eradicate tiger pear it is supplied at half price. The cost of free eradication work and free prickly-pear spray supplied during the year to landowners, government departments and instrumentalities, amounted to $110,622.

The destruction of prickly-pear on all unoccupied Crown lands is the responsibility of the Commission. The work was continued throughout the year and the cost to maintain these areas free from prickly-pear was $14,191.

Prickly-pear eradication work, which cost $205,122, was carried out under contract by the Commission for one hundred and eighty-four private landowners. Some owners were assisted, regarding payment for the work, by allowing them to pay by instalments over a period of years at a low interest rate.

The total expenditure by the Commission for the year ended 30th June, 1980, was $1,189,086.60. An increase of $56,822.93 compared with last year.

Sundry debtors increased by $2,283.98. The amount outstanding is $19,358.03 compared with $17,044.05 last year.

There were forty-six Prickly-pear Leases covering an area of 22 355 hectares at 30th June, 1980, of which thirty-one comprising 15 949 hectares were leases in perpetuity.

The Prickly-pear Destruction Commission has a staff of three administrative officers, two scientific officers engaged on research work and forty-eight men on field duties. They comprise ten Public Service Board appointees and forty-three employed under the Prickly-pear Act. The field staff operate from office and depot facilities located at Dubbo, Mudgee, Singleton, Scone, Tamworth, Bingara, Ashford, Moree and Mungindi.

A statement of income and expenditure of the Prickly-pear Destruction Commission for the year ended 30th June, 1980, follows.

V. H. GRAY,
Commissioner.

PRICKLY-PEAR DESTRUCTION COMMISSION

Statement of Income and Expenditure as at 30th June, 1980

	$
Balance Unexpended as at 30th June, 1979	3,041.78
Special Appropriation	60,000.00
Supplementation from Consolidated Revenue	917,000.00
Collections	211,276.67
	$1,191,318.45

	$
Salaries	148,049.16
Wages	472,222.06
Allowances	27,928.58
Workers' Compensation and Payroll Tax	46,576.63
Salary Items not subject to Payroll Tax	14,115.92
Travelling Allowances and Expenses ..	58,136.42
Maintenance of Motor Vehicles and Caravans	90,907.80
Purchase of Motor Vehicles and Caravans	174,086.02
Purchase of Stock, Plant and Minor Equipment	107,906.56
Rent, Rates, Freight and Cartage ..	5,610.00
Buildings, Improvements and Insurances	39,148.80
Postal and Telephone Charges	4,398.65
	1,189,086.60
Balance Unexpended 30th June, 1980 ..	2,231.85
	$1,191,318.45